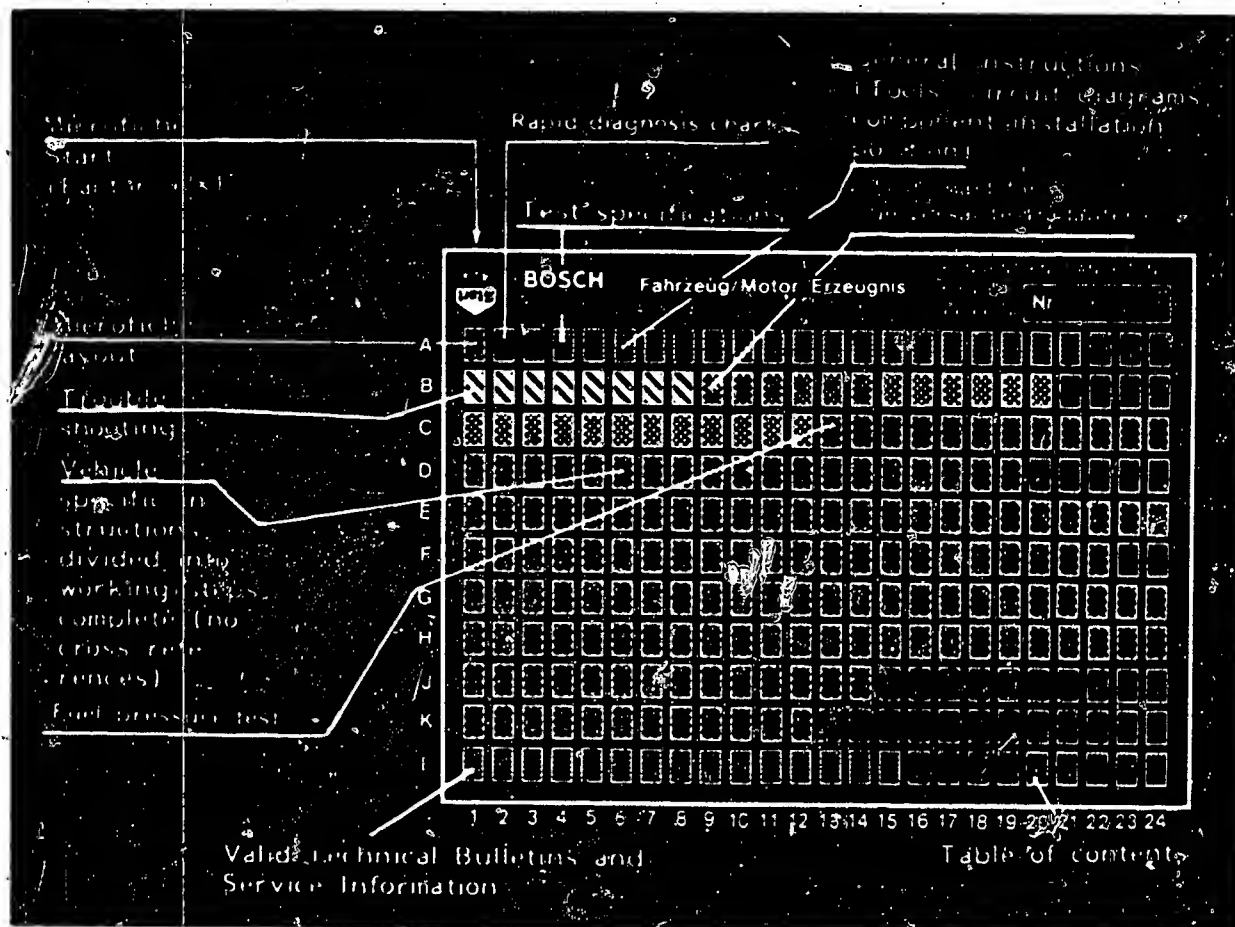


Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

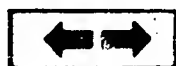
E 16	Product/assembly/test step	
	Vehicle/engine	

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C 6

A1

Trouble-Shooting Plan



Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced LE-Jetronic expert to quickly check the electrical part of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on the multimeter
- References to coordinates of the relevant detailed testing and trouble-shooting program.

If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate B 1/B 2.



Rapid diagnosis chart for universal test adapter

Test step	Switch position		Remarks	Test specifications (reading)	See Coordinate for trouble-shooting
	V	Ω			
1	5	-	Shift gear to neutral. Operate starting motor. Measure voltage pulses with motorester.	Ignition pulses on motortester	B 10
2	6	-	Shift gear to neutral. Operate starting motor. Measure voltage.	8 ... 15 V	B 12
3	7	-	Shift gear to neutral. Operate starting motor. Measure voltage.	8 ... 15 V	B 14
4	↓	11	Measure resistance.	100 Ω ... 200 Ω	B 16
5	↓	12	Deflect air-flow sensor flap. Measure resistance.	60 Ω ... 1000 Ω	B 19
6	↓	13	Measure resistance.	30 Ω ... 30k Ω (depends on temperature)	C 1
7	↓	14	Measure resistance.	0 ... 10 Ω	C 3
8	↓	16	Accelerator in rest position. Measure resistance.	0 ... 10 Ω	C 5
9	↓	17	Accelerator in full-load position. Measure resistance.	0 ... 10 Ω	C 8
10	↓	18	Measure resistance.	+ 20°C: 7.00...9.50 Ω + 80°C: 7.20...10.00 Ω	C 10

A3

Rapid diag. chart for univers. test adapt.
Volvo 360 GLT



A4

Rapid diag. chart for univers. test adapt.
Volvo 360 GLT



Test specifications

Idle speed

Manually-shifted transmission
and automatic transmission

850...950 min⁻¹

B7

Exhaust-gas setting

CO setting with engine
at normal operating
temperature

without Pulsair valve:

0.5...2.0% by vol.CO

with Pulsair valve:

0.3...0.5% by vol.CO

Fuel pump delivery

min. 700 cm³/30 sec

Solenoid-operated injection valve

Electrical internal resistance
at 20° C:

15.0...17.5 Ω

Fuel pressure

2.3...2.7 bar

C13

Auxiliary-air device

Electrical internal
resistance:

35...70 Ω

B5

Temperature sensor II (water)

Electrical internal resistance
at ambient temperature
(+15° C...+30° C):

1.30...3.6 kΩ

with engine at normal
operating temperature
(approx. +80° C):

250...390 Ω

B7

A5

Test specifications

Volvo 360 GLT



Thermo-time switch

Electrical internal resistance:

B7

	Between Term. "G" and ground	Between Term. "W" and ground	Between Term Term. "G" and "W"
Ambient temperature (below 30°C)	25...40 Ω	0 Ω	25...40 Ω
Engine temperature (above 40°C)	50...80 Ω	100...160 Ω	50...80 Ω

Air-flow sensor

B5

Resistance between:

Term. 8 and term. 6	340 ... 450 Ω
Term. 7 and term. 6	60 ... 1000 Ω
Term. 8 and term. 9	160 ... 300 Ω
Term. 9 and term. 6	500 ... 760 Ω

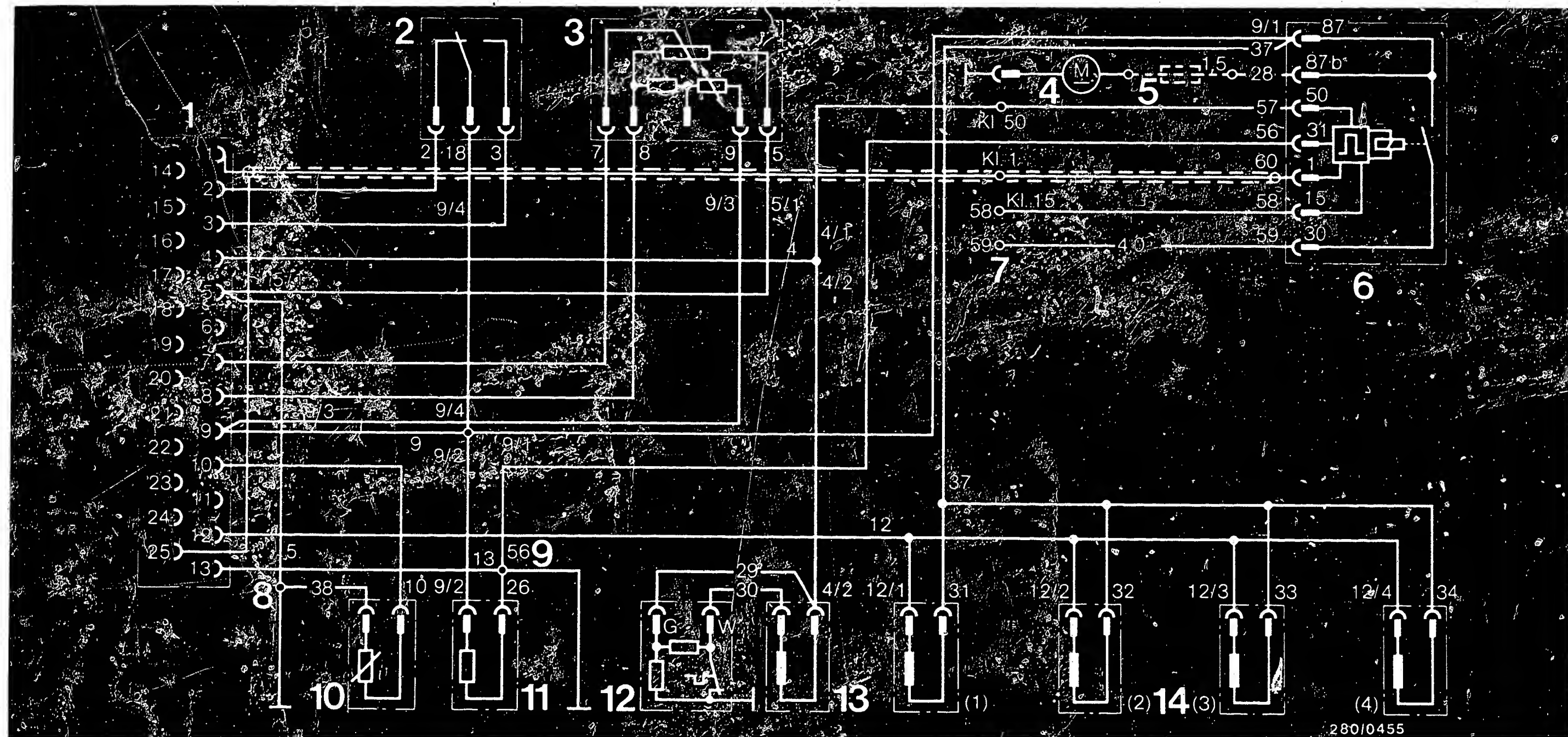
See equipment and Autodata microfiches for settings for ignition, valve clearance and other engine data.

A6

Test specifications

Volvo 360 GLT





Electrical terminal diagram - LE-Jetronic

- 1 = Multiple plug
- 2 = Throttle-valve switch
- 3 = Air-flow sensor
- 4 = Electric fuel pump
- 5 = Fuel pump fuse

- 6 = Control relay
- 7 = Battery (+)
- 8 = Output stage ground terminal
- 9 = Ground terminal (electronics)
- 10 = Temperature sensor (engine)

- 11 = Auxiliary-air device
- 12 = Thermo-time switch
- 13 = Start valve
- 14 = Injection valves

A7

Electrical terminal diagram

Volvo 360 GLT



A8

Electrical terminal diagram

Volvo 360 GLT



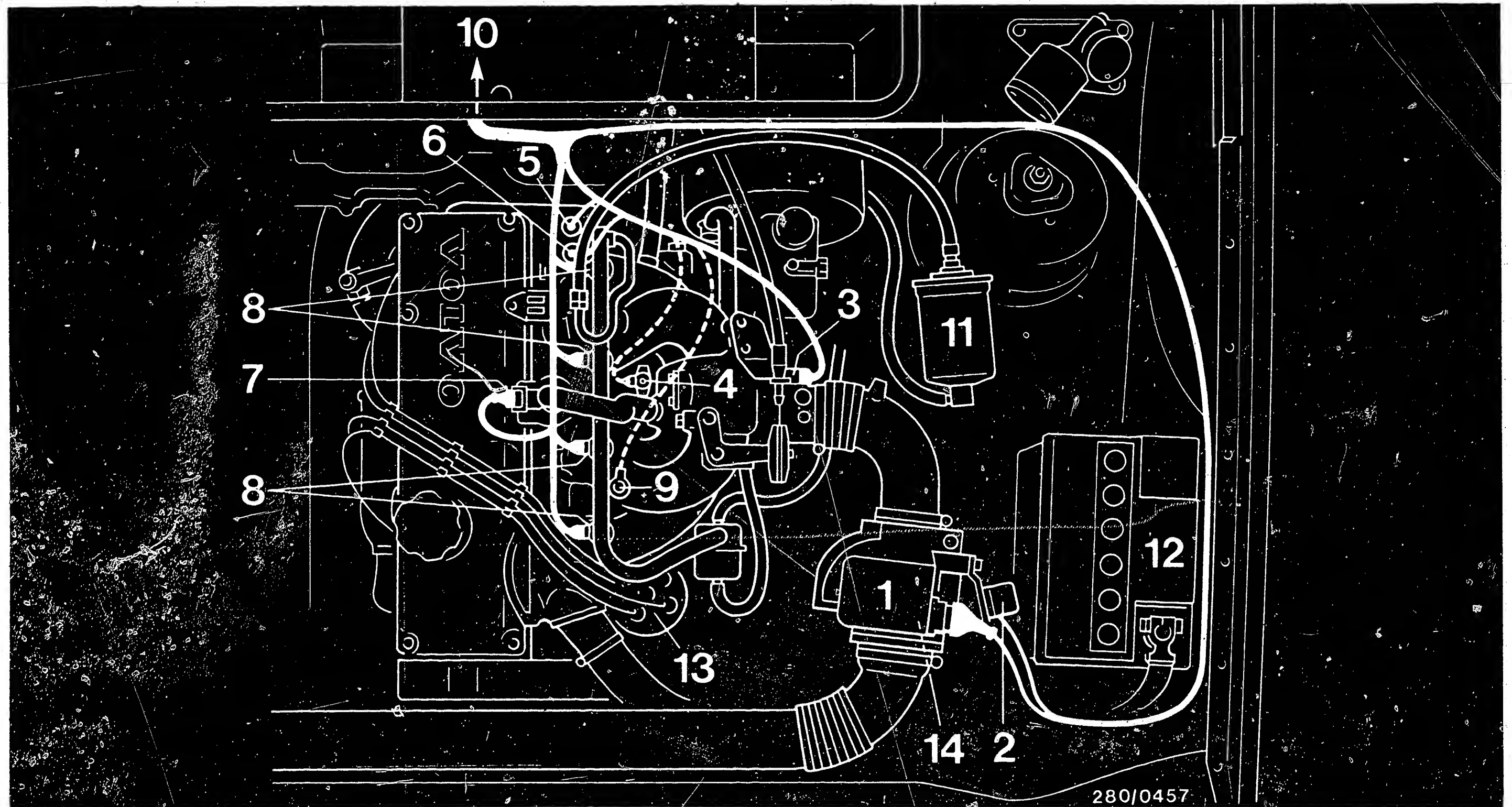


Diagram of electric lines - L-Jetronic - Volvo 360 GLT

- | | | | |
|---------------------------|--------------------------|----------------------|---------------------------|
| 1 = Air-flow sensor | 5 = Thermo-time switch | 9 = Central ground | 12 = Battery |
| 2 = Control relay | 6 = Temperature sensor | 10 = To control unit | 13 = Ignition distributor |
| 3 = Throttle-valve switch | 7 = Auxiliary-air device | 11 = Fuel filter | 14 = Ignition coil |
| 4 = Start valve | 8 = Injection valves | | |

A9

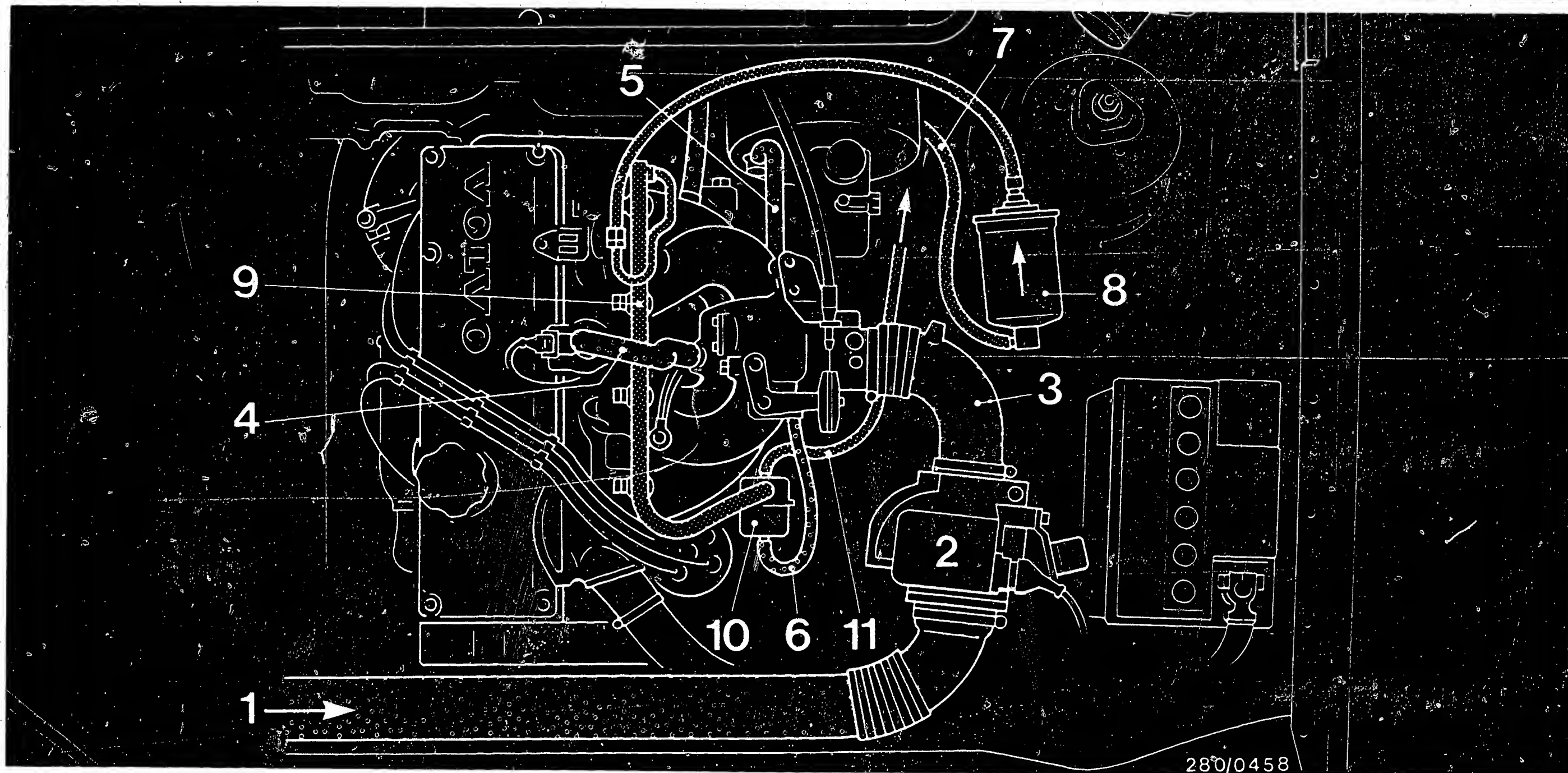
Diagram of electric lines
Volvo 360 GLT



A10

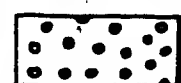
Diagram of electric lines
Volvo 360 GLT





280/0458

Air and fuel hoses in engine compartment



= Air



= Fuel

1 = From air filter

2 = Air-flow sensor

3 = Hose between air-flow sensor and throttle valve

4 = Hose between auxiliary-air device and intake manifold

5 = Hose between intake manifold and brake booster

6 = Hose between pressure regulator and intake manifold

7 = Fuel delivery line

8 = Fuel filter

9 = Fuel-distribution pipe

10 = Pressure regulator

11 = Fuel return hose

A11

Diagram of air and fuel hoses

Volvo 360 GLT



A12

Diagram of air and fuel hoses

Volvo 360 GLT



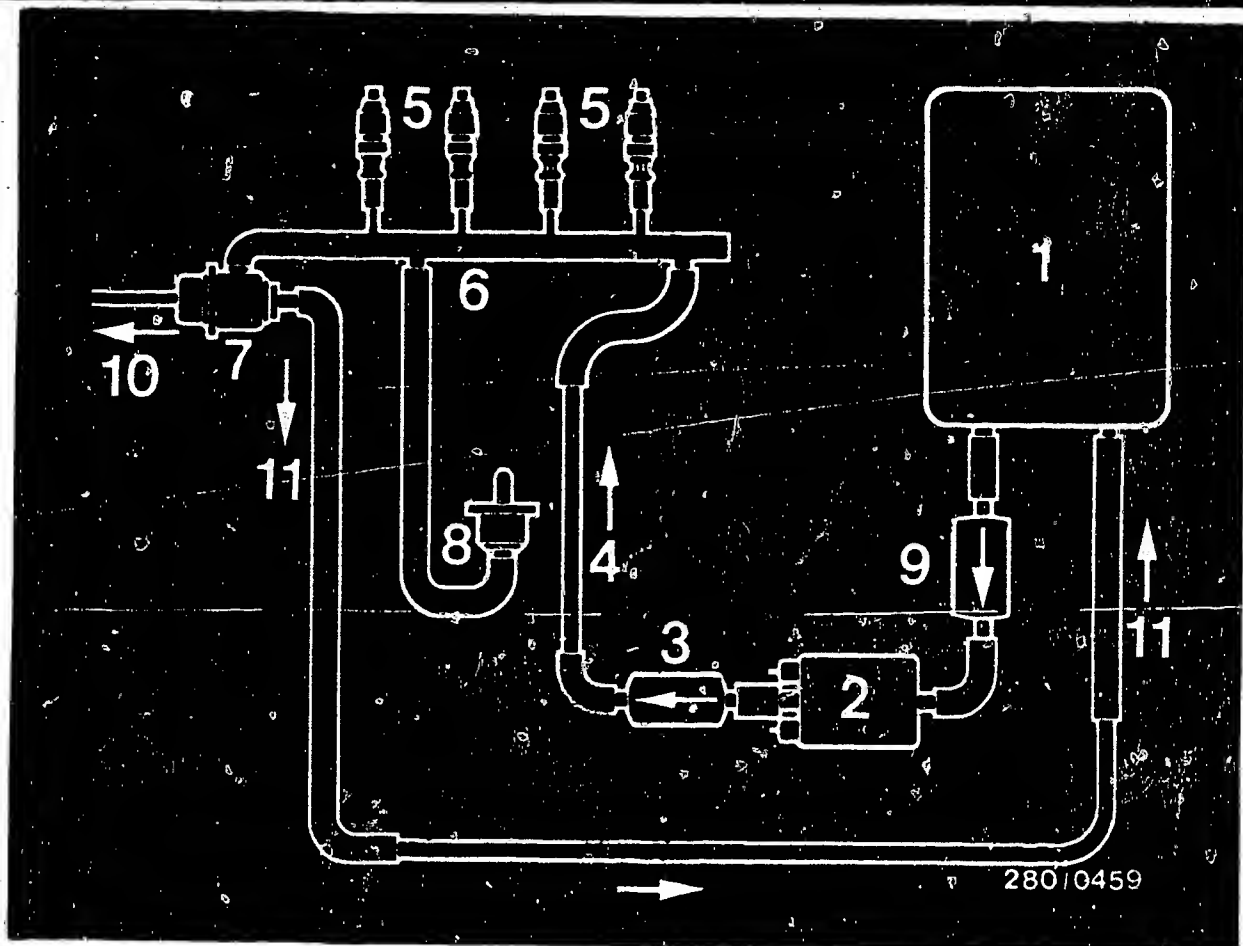


Diagram of fuel lines

- 1 = Fuel tank
- 2 = Electric fuel pump
- 3 = Fuel filter (delivery side)
- 4 = Fuel delivery line
- 5 = Solenoid operated injection valves
- 6 = Fuel-distribution pipe
- 7 = Pressure regulator
- 8 = Start valve
- 9 = Fuel filter (intake side)
- 10 = Connection to intake manifold
- 11 = Fuel return line



Test equipment and tools

Universal test adapter	ETT 018.01	0 684 101 801
Adapter lead		1 684 463 123
Motortester	e.g. MOT 002.0	0 684 000 200
	MOT 300	0 684 000 300
	MOT 400	0 684 000 400
Exhaust-gas analyzer uncalibrated	e.g. ETT 008.00	0 684 100 800
Exhaust-gas analyzer calibrated	ETT 008.04	0 684 100 804
Test lead		1 684 463 093
Three-way line		KDJE P-100/13
Pressure gauge	Quality class 1.0 = 6 bar, 0.1 bar gradua- tions	1 687 231 154 KDJE-P 100
Pressure tester or Pressure tester (no longer available)		KDEP 1034
Parts set		1 287 010 704
Electrics tester or multimeter	e.g. ETE 014.00 e.g. Philips PM 2517 X e.g. Mislco Master 50 K e.g. Chinaglia Cortina	0 684 101 400
Solenoid-operated injection valve		0 280 150 209

Use suitable commercially available tools for fitting and removing the idle CO anti-tamper device on the air-flow sensor.



Instructions on use of universal test adapter with adapter lead for LE-Jetronic

General:

The universal test adapter is plugged onto the vehicle wiring harness with the adapter lead.

Caution:

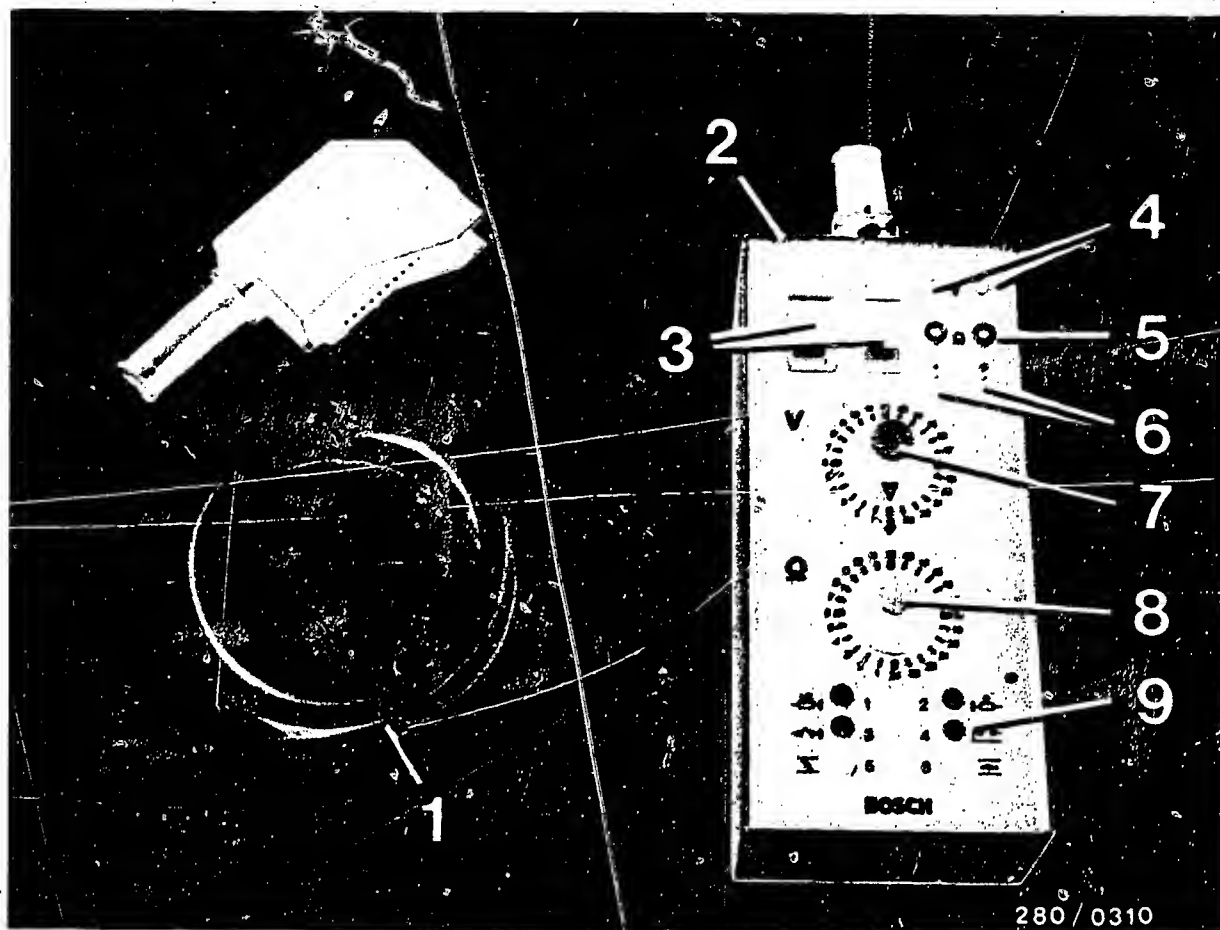
Connect and disconnect the universal test adapter only with the ignition switched off!

Testing:

For testing, connect a multimeter with $R_i \text{ min. } 20 \text{ k}\Omega/\text{V}$ to the universal test adapter.

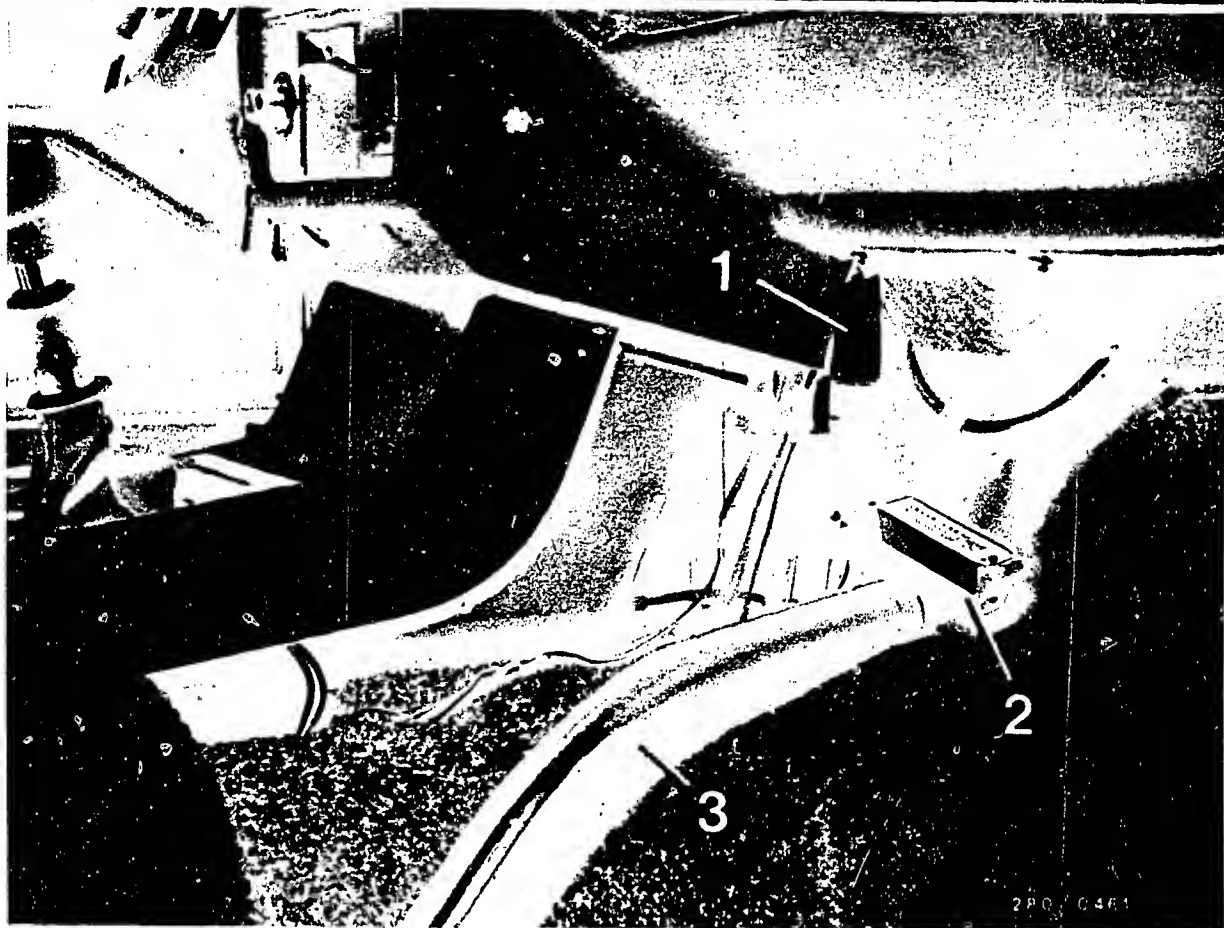
In addition, the signal from term. 1 of the ignition coil can be measured with a motortester via the special input.





Universal adapter with adapter lead for 2nd generation L-Jetronic

- 1 = Adapter lead (Part No.: 1 684 463 123)
- 2 = Universal adapter (Part No.: 0 684 001 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Test sockets (not yet occupied)
- 7 = Program switch "volt"
- 8 = Program switch "ohm"
- 9 = Button panel (not occupied for LE-Jetronic)



- 1 = Control unit
- 2 = Multiple plug (wiring harness)
- 3 = Heater hose for rear heating

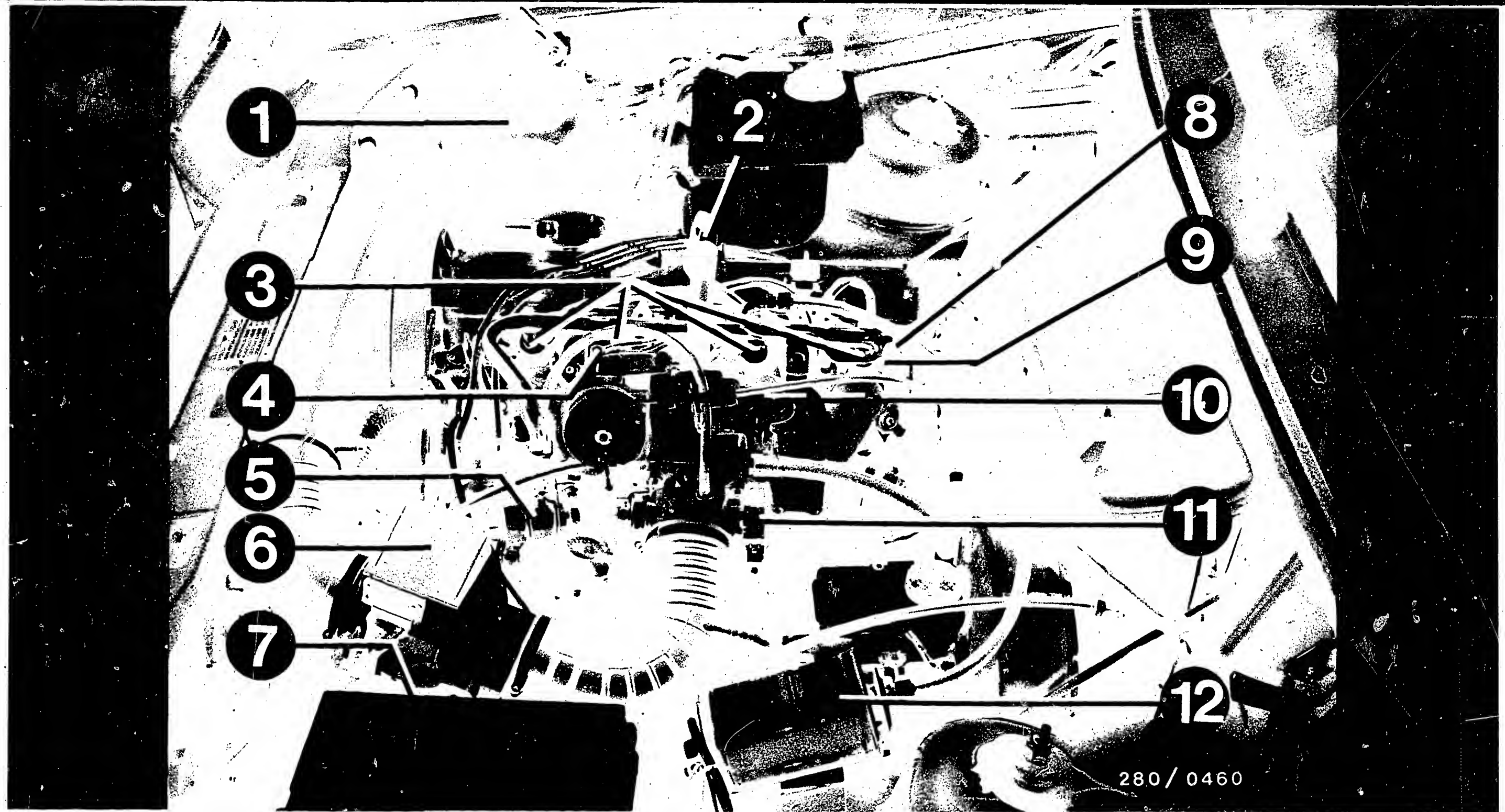
Installation position of components

The indications "right" and "left" always apply as viewed in the forward direction of travel

Control unit

The control unit is in the passenger compartment, transverse behind the center console. To remove the control unit, remove the center console panelling on left and right and remove the left-hand heater hose. The control unit is fastened in position by 3 screws.





Installation position of components (Volvo 360 GLT) continued

- | | | |
|--|------------------------|------------------------------------|
| 1 = Air filter | 5 = Pressure regulator | 9 = Temperature sensor II (engine) |
| 2 = Auxiliary-air device | 6 = Air-flow sensor | 10 = Start valve |
| 3 = Injection valves | 7 = Control relay | 11 = Throttle-valve switch |
| 4 = Ground terminal (electronics and output stage) | 8 = Thermo-time switch | 12 = Fuel filter |

A18

Installation position of components
Volvo 360 GLT



A19

Installation position of components
Volvo 360 GLT



Installation position of components

Electric fuel pump and fuel filter (intake side):

Underneath vehicle transverse behind rear axle on cover plate.

Pump fuse:

In engine compartment on left-hand side, near battery, two 8A fuses.



Important general information

1. Never start engine without securely connected battery.
2. Do not use a starting aid with more than 16 V or a fast charger for starting.
3. Never disconnect battery from vehicle electrical system with engine running.
4. Disconnect battery from vehicle electrical system when fast charging.
5. Remove control unit at temperatures above 80°C (paint drying installation).
6. Ensure that all connectors of wiring harness are properly attached.
7. Never connect or disconnect wiring-harness plug of control unit with ignition switched on.
8. When testing compression, cut the power supply by removing the control relay. This ensures that the voltage supply for the LE-Jetronic and therefore also the injection valves is interrupted. Undesired injecting is thus prevented.
9. Remove the LE-Jetronic control unit before carrying out electric welding work (e.g. spot welding).
10. When using the following trouble-shooting program it is assumed that the engine is in proper working order and that the ignition is correctly set. The electrical system must be checked and, if necessary, repaired.

In order to carry out the testing operations described in this manual and in order to assess the components, you should be familiar with the L-Jetronic and how it works. The essential points regarding the operation and construction of the L-Jetronic are described in Technical Instruction VDT-U3/3.



Trouble-shooting

The following trouble-shooting programs are designed to enable workshop employees, using the universal adapter with adapter lead (1 684 463 123) and other suitable test equipment, to quickly locate causes of trouble on the L-Jetronic. Depending on the level of knowledge and experience of the mechanic, a choice can be made between the following procedures:

- detailed step-by-step trouble-shooting for employees with little experience or practice on LE-Jetronic vehicles
- pin-pointed direct trouble-shooting for trained, experienced employees who have had a great deal of practice on LE-Jetronic vehicles

B3**B5**

Both trouble-shooting programs begin by checking the electrical part of the LE-Jetronic with the aid of the universal adapter with adapter lead. In this way, the wiring harness with the connected components is soon checked for proper electrical operation and faults are quickly located.

If no fault is found using the universal adapter with adapter lead, continue trouble-shooting with the detailed or the direct trouble-shooting program.

B1

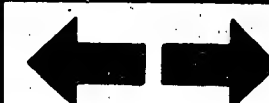
Trouble-shooting

Volvo 360 GLT

**B2**

Trouble-shooting

Volvo 360 GLT



1. Detailed, step-by-step trouble-shooting

1.1 Test with universal test adapter with adapter lead 1 684 463 123

This test must come at the start of the test program and must be performed from beginning to end (Coordinates B9...C12).

1.2 Fuel pressure test

This test must come immediately after the test with the universal adapter and must be performed from beginning to end (Coordinates C13-D3).

1.3 Trouble-shooting according to customer complaints (fault symptoms)

The table below contains possible fault symptoms and the right-hand column gives the first coordinate of the corresponding detailed trouble-shooting program.


This trouble-shooting program consists of logically ordered test procedures for all individual components of the LE-Jetronic. If, after completing the trouble-shooting program for an assumed symptom, the fault has not been detected and remedied, choose a new symptom of the trouble and work through another program.

<u>Customer complaints (fault symptoms)</u>	<u>Test with universal test adapter</u>	<u>Fuel pressure test</u>	<u>Trouble-shooting program</u>
1. Starting motor operates but engine fails to start or starts only with great difficulty	B 9	C 13	D 4
2. Engine starts but then dies	B 9	C 13	E 1
3. Uneven engine idle	B 9	C 13	E 11
4. Poor throttle take-up	B 9	C 13	F 13
5. Engine missing under all operating conditions	B 9	C 13	G 7
6. Fuel consumption too high	B 9	C 13	H 7
7. No maximum engine power	B 9	C 13	J 5
8. CO concentration at idle too high or too low	B 9	C 13	K 1

B3

Trouble-shooting


Volvo 360 GLT



B4

Trouble-shooting

Volvo 360 GLT



2. Pin-pointed direct trouble-shooting

2.1 Test with universal test adapter with adapter lead 1 684 463 123

The test with the universal test adapter must come at the beginning of the test program and must be performed from beginning to end (Coordinates B9...C12).

2.2 Fuel pressure test

This test must come immediately after the test with the universal test adapter and must be performed from beginning to end (Coordinates C13...D3).

2.3 Trouble-shooting according to customer complaints

The table below contains various symptoms of trouble with several possible causes of the trouble in each case. The coordinate reference field indicates the first coordinate of the test procedure for the respective LE-Jetronic component. If, after testing the individual components, the fault has not been detected or remedied, choose a new symptom of the trouble.

Customer complaint (symptom of trouble)

1. Engine fails to start or starts only with great difficulty								
2. Engine starts but then dies								
3. Uneven engine idle, idle speed incorrect								
4. Poor throttle take-up								
5. Engine missing under all operating conditions								
6. Fuel consumption too high								
7. No maximum engine power								
8. CO concentration at idle too high or too low								
Cause (component fault)								
B 9	B 9	B 9	B 9	B 9	B 9	B 9	B 9	Universal test adapter
C13	C 13	C 13	C 13	C 13	C 13	C 13	C 13	Fuel pressure test (control relay defective, pressure regulator defective. Pump not operating, fuel pressure loss)
D 12	E 5		F 17					Auxiliary-air device not opening
		E 19						Auxiliary-air device not closing
D 14		F 5	F 19	G 11	H 19	J 13	K 5	Air-flow sensor defective
			F 21	G 13	H 21			Air-flow sensor potentiometer test

Continued on B 7/B 8

B5

Trouble-shooting

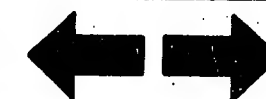
Volvo 360 GLT



B6

Trouble-shooting

Volvo 360 GLT



Customer complaint (symptom of trouble)

1. Engine fails to start or starts only with great difficulty							
2. Engine starts but then dies							
3. Uneven engine idle, idle speed incorrect							
4. Poor throttle take-up							
5. Engine missing under all operating conditions							
6. Fuel consumption too high							
7. No maximum engine power							
8. CO concentration at idle too high or too low							
Cause (component fault)							
D 6							Start valve not opening
D 8	E 3	E 15			H11	K 7	Start valve leaking
D10		E21					Thermo-time switch defective
D16	E 7	F 7	G 1			J15 K11	Air-intake system leaking
		E 21		H 1	H21		Solenoid-operated injection valves defective (operation, repair)
				G 19			Burbling (exhaust system, overrun cutoff)
				G 17		J11	Fuel delivery too low
					H 9	K 9	Temperature sensor II in engine defective
		E 13	F15	G19			Throttle valve not closing
						J 7	Throttle valve not opening fully
D16	E 7	F 7	G 1	G 9		J15	Poor central ground, loose contacts, faulty plug-in connections
				G11			Voltage peaks
				G19		J 7	Throttle-valve switch defective (full-load enrichment)
		E17	G 3		J1	K 3	CO exhaust-gas setting too rich, idle adjustment. On Sweden version only: (Pulsair system; exhaust-gas recirculation)
		E17	G 3	G 21		K 3	CO exhaust-gas setting too lean, idle adjustment. On Sweden version only: (Pulsair system, exhaust-gas recirculation)
				G 17			Control unit defective

B7

Trouble-shooting

Volvo 360 GLT



B8

Trouble-shooting

Volvo 360 GLT



Test chart for universal adapter with adapter lead connected - LE-Jetronic

Test chart for Volvo 360 GLT (as of 9.82)

Carefully plug the universal test adapter onto the vehicle wiring harness (ignition must be off).

The universal test adapter is used for testing the peripherals only. In order to obtain the measured values, connect to the universal test adapter e.g. a multimeter for voltage and resistance measurements as well as a motortester.

The individual test steps are selected by means of two program switches (one for voltage measurements, the other for resistance measurements). Each program switch has 24 test positions, only some of which are occupied for the LE-Jetronic.

The test with the universal test adapter must always be performed from beginning to end.

Be sure to observe the instructions given in the test chart!

In test steps 1-3, voltages are measured while starting.
Caution: Set the multimeter to "voltage measuring range".

In test steps 4-10, resistances are measured.

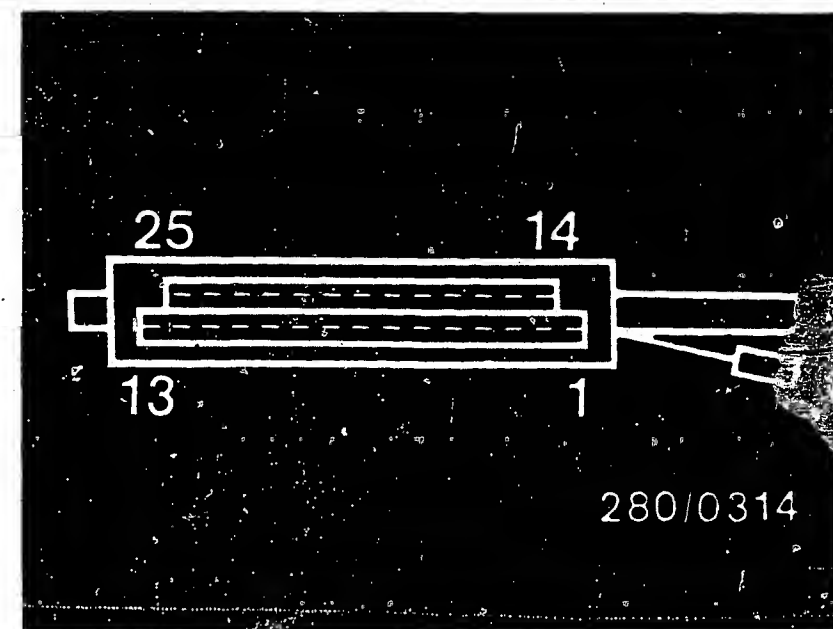
Caution: Set the multimeter to "resistance measuring range".

Test specifications and operator information for the universal test adapter are given in the following test chart: The control unit is located in the passenger compartment transverse, behind the center console. It is fastened in position by three screws.



Note:

In the following test steps a white surround in the "Operation" column indicates which operation is different from the preceding test step.



Test step: 1			
Operation		Reading	Testing
Program switch position "V"	5	Ignition oscilloscope must indicate <u>Ignition pulses</u> If reading O.K., continue testing with the <u>next test step</u>	Component: Signal from term. 1
Program switch position "Ω"	1) -		
Measuring equipment: Motortester			Operation: Triggering of control unit by the ignition
Measuring range: Special input. Control stick up against left-hand stop and measuring range. 20 V			
Connection: Test wells			Malfunction: No reading
Operation in vehicle: Ignition "ON" and operate starting motor			

K1. = Terminal

Top view of multiple plug

Installation position of components

1. Electronics ground terminal:
In engine compartment, on front fastening screw for fuel-distribution pipe.

Trouble-shooting:

For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

Test the following leads for continuity using ohmmeter (set value 0 Ω):

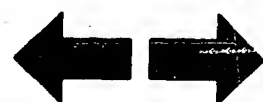
- From multiple plug term. 1 to ignition coil term. 1
- From multiple plug term. 5 to electronics ground terminal.

Eliminate contact resistances in the plug-in connections.

1) Switch position not specified.

B 10

Test chart for universal test adapter
Volvo 360 GLT



B 11

Test chart for universal test adapter
Volvo 360 GLT



Test step 2: Operation		Reading	Testing
Program switch position "V"	6	Multimeter must indicate 8 ... 15 V	Component: Control relay, voltage supply
Program switch position "Ω"	-		
Measuring equipment: Multimeter (volt range)		If reading O.K., con- tinue testing with next test step	Operation: Voltage supply
Measuring range: 0 ... 15 V			
Connection: Test sockets red (positive) and black			Malfunction: No voltage reading
Operation in vehicle: Ignition "ON" and operate starting motor			

Trouble-shooting:

For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

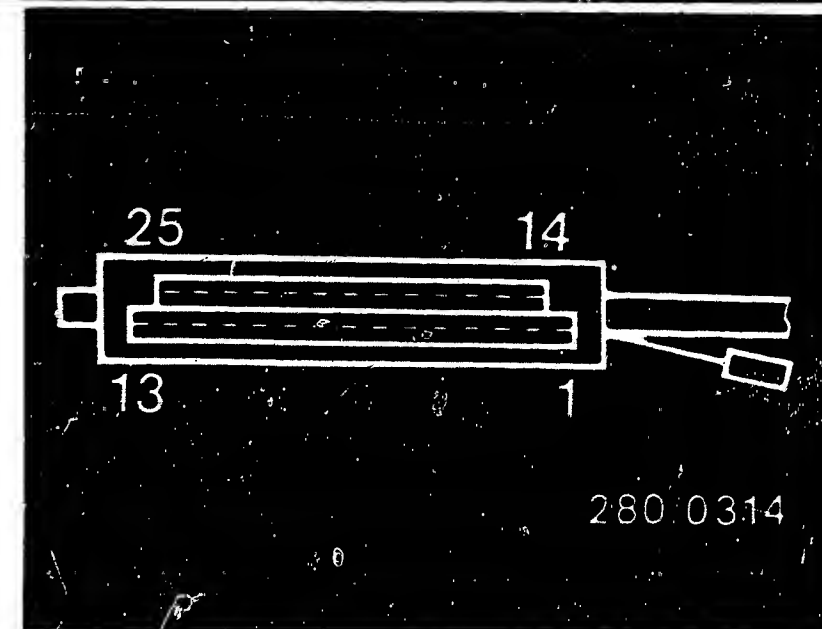
Test the following leads for continuity using ohmmeter (set value: approx. 0 Ω):

- From multiple plug term. 9 to control relay term. 87
- Warning! disconnect battery! From control relay term. 30 to battery (positive terminal)
- From multiple plug term. 5 to electronics ground terminal
- Reconnect battery.

Eliminate contact resistances at the plug-in connections.

Installation position of components:

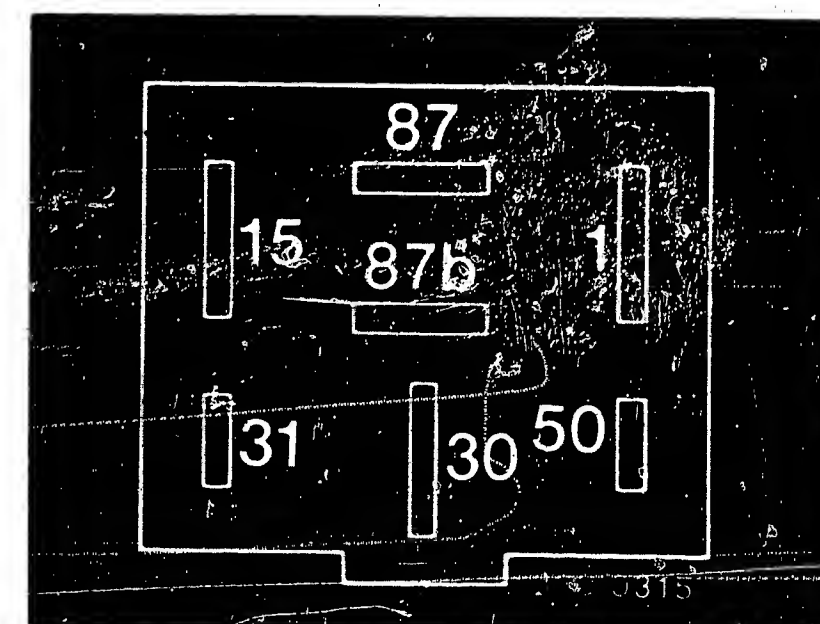
1. Control relay: On left-hand side at front in engine compartment, next to air-flow sensor.
2. Electronics ground terminal: In engine compartment, on front fastening screw for fuel distribution pipe.



Kl. = Terminal

Top view of multiple plug

Control relay
(top view of connection base)



B12

Test chart for universal test adapter

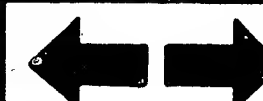
Volvo 360 GLT



B13

Test chart for universal test adapter

Volvo 360 GLT



<u>Test step: 3</u>		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch position</u> "V"	7	Multimeter must indicate 8 ... 15 V If reading O.K., continue testing with <u>next test step.</u>	<u>Component:</u> Control relay, starting moter term. 50
<u>Program switch position</u> "Ω":	-		
<u>Measuring equipment:</u> Multimeter (volt range)			<u>Operation:</u> Starting signal
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Test socket red (positive) and black			<u>Malfunction:</u> No voltage reading
<u>Operation in vehicle:</u> Ignition "ON" and operate starting motor			

Trouble-shooting:

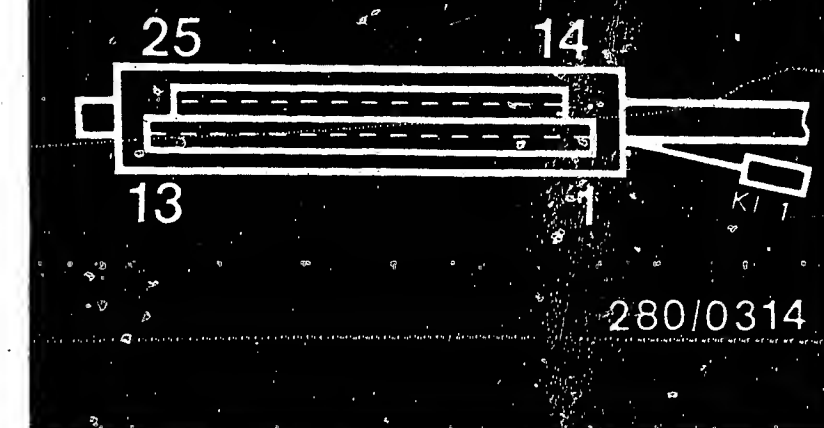
For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

Test the following leads for continuity using ohmmeter (set value: approx. 0 Ω):

- From multiple plug term. 4 to control relay term. 50
- From control relay term. 1 to ignition coil term. 1.
- From multiple plug term. 5 to electronics ground terminal.

Installation position of components:

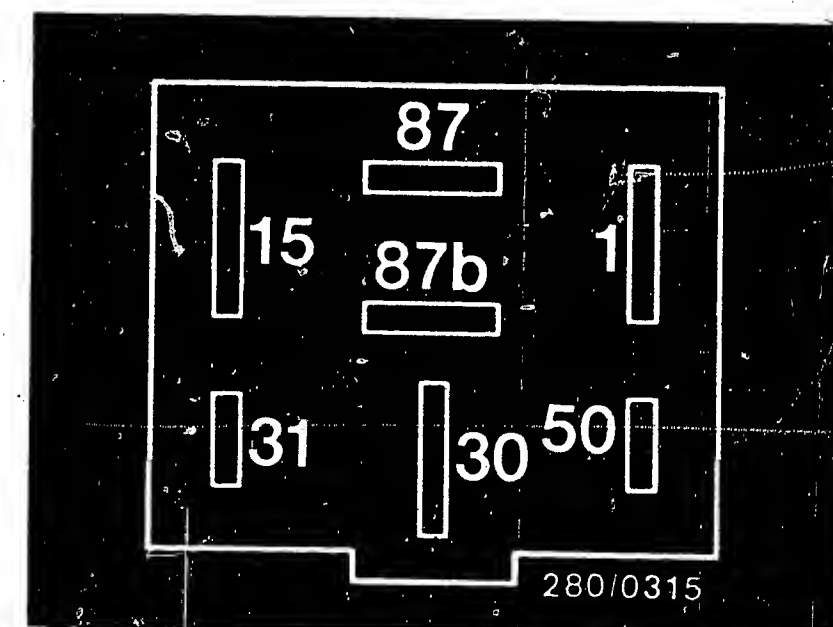
1. Control relay: On left-hand side in engine compartment, next to air-flow sensor
2. Electronics ground terminal: In engine compartment on front fastening screw for fuel-distribution pipe.



K1. = Terminal

Top view of multiple plug

Control relay
(top view of connection base)



B 14

Test chart for universal test adapter
Volvo 360 GLT



B 15

Test chart for universal test adapter
Volvo 360 GLT



<u>Test step: 4</u>		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch position</u> "V"	↓	Multimeter must indicate <u>100 ... 200 Ω</u> If reading O.K., continue testing with <u>next test step.</u>	<u>Component:</u> Air-flow sensor (temperature sensor I)
<u>Program switch position</u> "Ω"	11		
<u>Measuring equipment:</u> Multimeter (Ω range)			<u>Operation:</u> Resistance between air-flow sensor term. 8 and electronics ground terminal
<u>Measuring range:</u> x 10 Ω			<u>Malfunction:</u> Resistance outside tolerance
<u>Connection:</u> Test sockets blue			
<u>Operation in vehicle:</u>			

Trouble-shooting:

For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω)

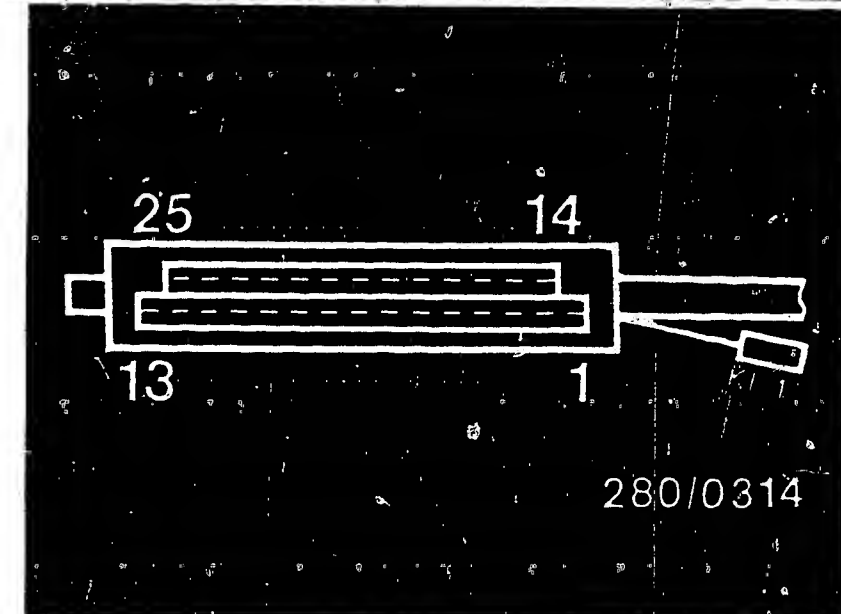
1. Auxiliary-air device

- From output stage ground terminal term. 26 to auxiliary-air device term. 26.
 - From auxiliary-air device term. 9 to multiple plug term. 9.
- Resistance of auxiliary-air device at term. 26 and term. 9: 35 ... 70 Ω

2. Electric fuel pump

- From control relay term. 87b through pump fuse to electric fuel pump (positive terminal).
- From electric fuel pump (negative terminal) to vehicle body ground terminal (fuse box on firewall).

Continued on B 18



K1. = Terminal

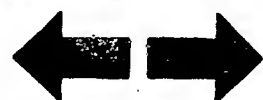
Top view of multiple plug

Installation position of components:

1. Auxiliary-air device: In engine compartment on valve cover
2. Electric fuel pump: Underneath vehicle, transverse behind rear axle on cover plate.
3. Pump fuse: 2 A fuse near battery
4. Output stage ground terminal: In engine compartment on front fastening screw for fuel-distribution pipe

B 16

Test chart for universal test adapter
Volvo 360 GLT



B 17

Test chart for universal test adapter
Volvo 360 GLT



TEST STEP: 4; Trouble-shooting (continued)

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

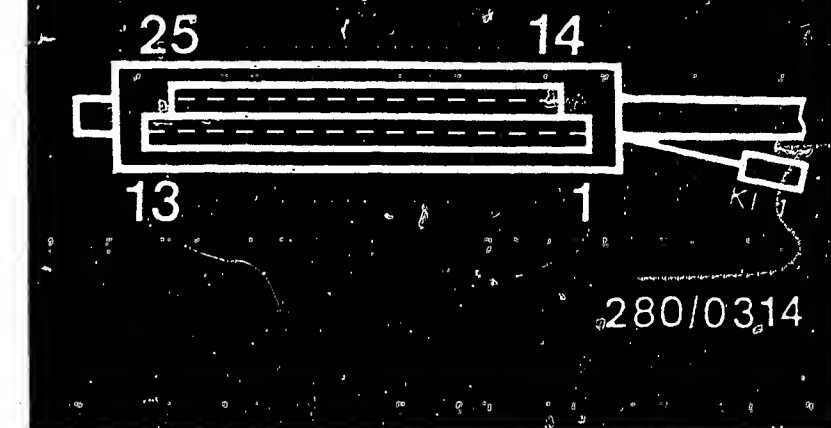
3. Air-flow sensor

- From multiple term. 8 to air-flow sensor term. 8.
- From air-flow sensor term. 5 to electronics ground terminal.
- From multiple plug term. 5 to electronics ground terminal.

Eliminate contact resistances in the plug-in connections.



Test step: 5			
Operation		Reading	Testing
Program switch position "V"	↓	Multimeter must indicate	Component: Air flow sensor (potentiometer)
Program switch position "Ω"	12	60 ... 1000 Ω	
Measuring equipment: Multimeter (Ω range)		If reading O.K., continue testing with <u>next test step.</u>	Operation: Resistance between air-flow sensor term. 7 and electronics ground terminal
Measuring range: x 10 Ω			
Connection: Test sockets blue			Malfunction: Resistance outside tolerance
Operation in vehicle: Deflect air-flow sensor flap			



K1. = Terminal

Top view of multiple plug

Trouble-shooting:

For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From multiple plug term. 7 to air-flow sensor term. 7
- From air-flow sensor term. 5 to electronics ground terminal
- From multiple plug term. 5 to electronics ground terminal

Eliminate contact resistances in the plug-in connections.

Installation position of components

1. Air-flow sensor:

In engine compartment front left

2. Electronics ground terminal:

In engine compartment, on front fastening screw for fuel-distribution pipe.

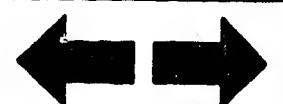
B 19

Test chart for universal test adapter
Volvo 360 GLT



B 20

Test chart for universal test adapter
Volvo 360 GLT



Test step: 6		Reading	Testing
Operation			
Program switch position "V":	↓	Multimeter must indicate	Component: Temperature sensor II (engine)
Program switch position "Ω"	13	30 Ω...30 kΩ (depends on temperature)	
Measuring equipment: Multimeter (Ω range)		If reading O.K., continue testing with next test step	Operation: Resistance between control unit term. 10 and electronics ground terminal
Measuring range: x 10 Ω or x 100 Ω			
Connection: Test sockets blue			Malfunction: Resistance outside tolerance
Operation in vehicle			

Trouble-shooting:

For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

Measure resistance directly at engine temperature sensor (white plug).

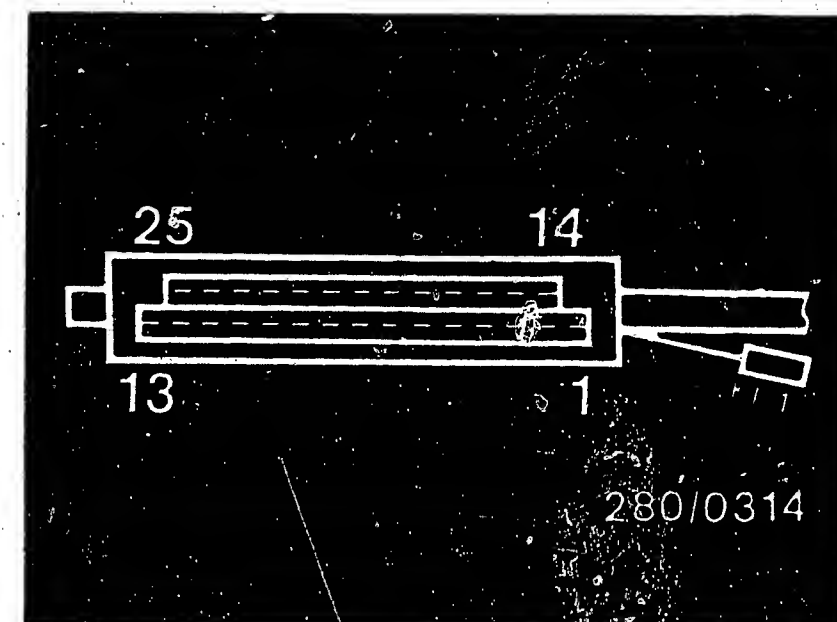
Ambient temperature (+15°C...+30°C): 1.3...3.6 kΩ

With engine at operating temperature
(approx. +80°C): 250...390 Ω

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From multiple plug term. 10 to temperature sensor II (engine) term. 10.
- Lead 38 from temperature sensor II to electronics ground terminal.

Eliminate contact resistances in the plug-in connections.



K1. = Terminal

Top view of multiple plug

Installation position of components:

1. Engine temperature sensor
In cooling water circuit at rear
on engine block
(under intake manifold).

2. Electronics ground terminal
In engine compartment on front,
fastening screw for fuel-distribu-
tion pipe.

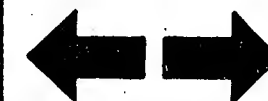
C1

Test chart for universal test adapter
Volvo 360 GLT



C2

Test chart for universal test adapter
Volvo 360 GLT



<u>Test step: 7</u>		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch position</u> "V":	↓	Multimeter must indicate <u>0...10 Ω</u> If reading O.K., continue testing with <u>next test step.</u>	<u>Component:</u> Ground connection of output stage
<u>Program switch position</u> "Ω":	14		
<u>Measuring equipment:</u> Multimeter (Ω range)			
<u>Measuring range:</u> x 1 Ω			
<u>Connection:</u> Test sockets blue			
<u>Operation in vehicle:</u> -----			<u>Malfunction:</u> Resistance outside tolerance

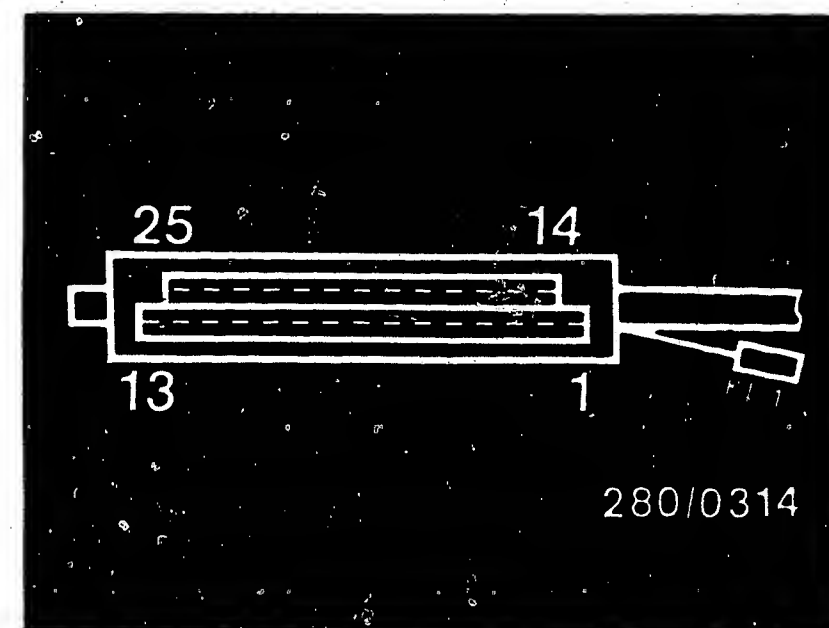
Trouble-shooting:

For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From multiple plug term. 13 to output stage ground terminal.
- From multiple plug term. 5 to electronics ground terminal.

Eliminate contact resistances at the plug-in connections.



280/0314

Kl. = Terminal

Top view of multiple plug

Installation position of components:

1. Output stage ground terminal
In engine compartment on front
fastening screw for fuel-distribu-
tion pipe

C3


Test chart for universal test adapter
Volvo 360 GLT

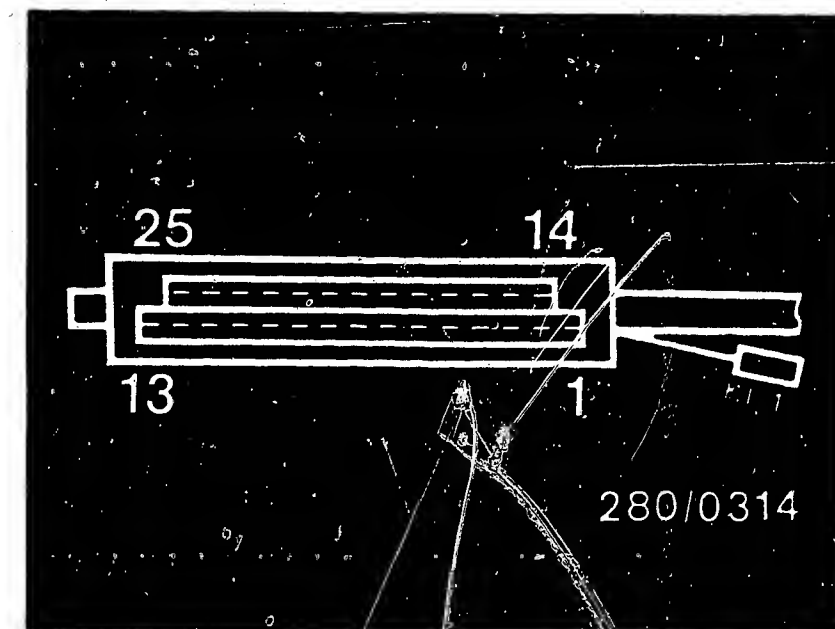


C4

Test chart for universal test adapter
Volvo 360 GLT



TEST STEP: 8		Reading	Testing
Operation			
<u>Program switch position</u> "V":		Multimeter must indicate <u>0...10 Ω.</u>	<u>Components:</u> Throttle-valve switch (idle contact)
<u>Program switch position</u> "Ω":	16		
<u>Measuring equipment:</u> Multimeter (Ω range)		If reading O.K., continue testing with <u>next test step.</u>	<u>Operation:</u> Resistance between throttle- valve switch term. 2 and lead 9 (term. 18)
<u>Measuring range:</u> x 1 Ω			
<u>Connection:</u> Test sockets blue			<u>Malfunction</u> Resistance outside tolerance
<u>Operation in vehicle:</u> Accelerator in rest position			



Top view of multiple
plug



Trouble-shooting:

For testing, remove wiring-harness plug from test adapter and use circuit diagram if necessary.

Adjusting the throttle-valve switch (on intake manifold):

Slightly loosen the throttle-valve switch mounting. Connect ohmmeter to throttle-valve switch between term. 2 and lead 9 (term. 18). Turn the throttle valve switch as far as it will go to the right (arrow A). Then turn to the left until the idle contact (micro-switch) can be heard to click (arrow B). (Reading 0 Ω). Secure throttle-valve switch in this position.

Checking the adjustment: Pull slightly on throttle cable.

The idle contact (microswitch) must be heard to click.
(Reading $\infty\Omega$).

Installation position of components:

Throttle-valve switch: On throttle-valve assembly on left-hand side in engine compartment.

Control unit: In passenger compartment transverse behind center console.

Continued on C 7

C5

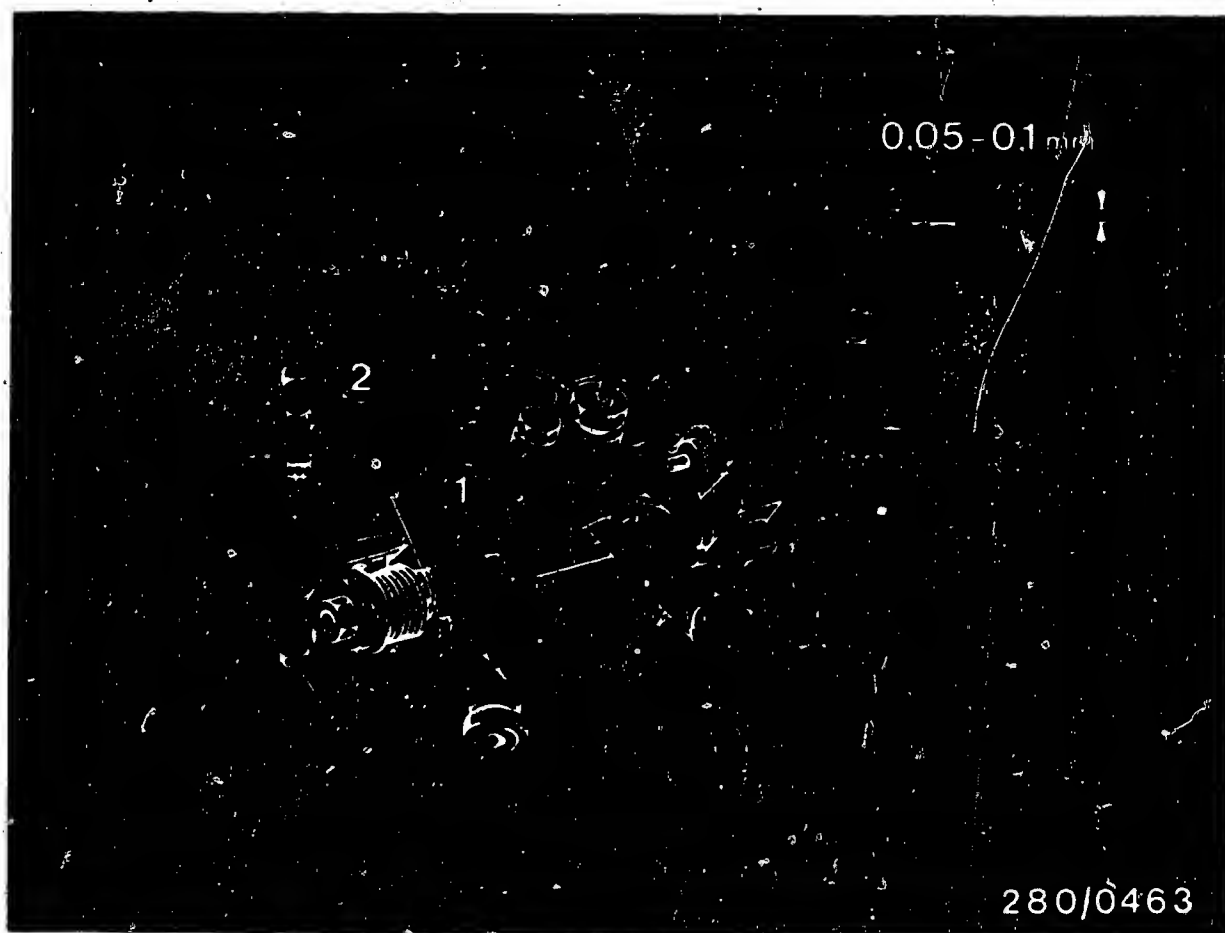
Test chart for universal test adapter
Volvo 360 GLT



C6

Test chart for universal test adapter
Volvo 360 GLT





TEST STEP: 8; Trouble-shooting (continued)


Setting the throttle gap (basic setting)

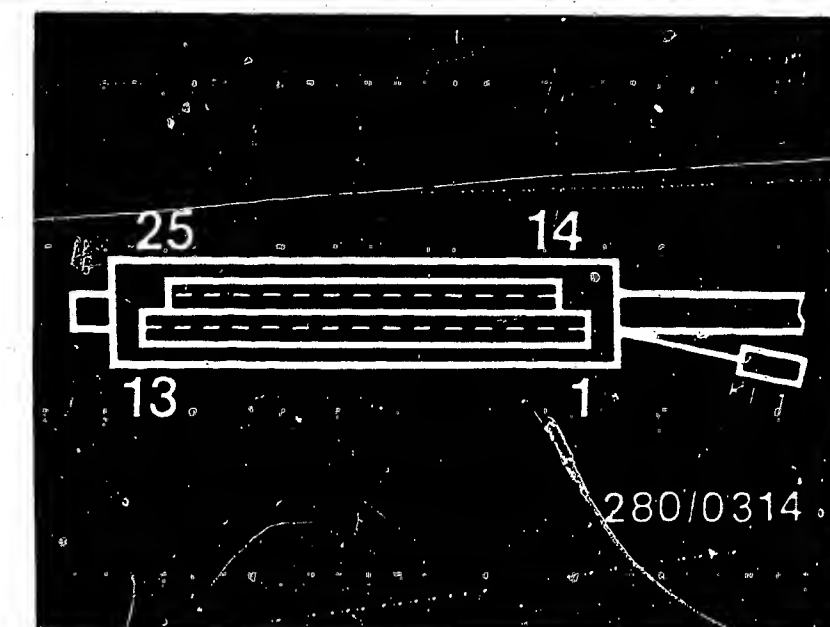
Slightly raise connecting bar (2). Throttle valve must open. Introduce a 0.05 mm feeler gauge on the top side between throttle valve and housing and release connecting bar (2). It must be possible to move the feeler gauge to and fro easily. Repeat using a 0.1 mm feeler gauge. It must not be possible to move this feeler gauge to and fro between throttle valve and housing. If necessary, adjust using the adjusting screw (1).

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From multiple plug term. 2 to throttle-valve switch term. 2.
- From throttle-valve switch term. 18 (lead 9) to multiple plug term 9.

Eliminate contact resistances in the plug-in connections.

Test step: 9			
Operation		Reading	Testing
Program switch position "V"		Multimeter must indicate 0...10 Ω	<u>Component:</u> Throttle-valve switch (full-load contact)
Program switch position "Ω"			
<u>Measuring equipment:</u> Multimeter (Ω range)		If reading O.K., continue testing with next test step.	<u>Operation:</u> Resistance between throttle- valve switch term. 3 and lead 9 (term. 18)
<u>Measuring range:</u> x 1 Ω			
<u>Connection:</u> Test sockets blue			<u>Malfunction:</u> Resistance outside tolerance
<u>Operation in vehicle:</u> Accelerator in full-load position			



Kl. = Terminal

Top view of multiple plug

Installation position of components:

Throttle-valve switch:
 On throttle-valve assembly on left-
 hand side in engine compartment.

Control unit:
 In passenger compartment transverse
 behind center console.

Trouble-shooting:

For testing, remove the wiring-harness plug from the test adapter and use the circuit diagram if necessary.

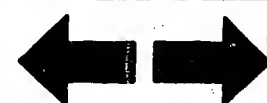
Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From multiple plug term. 3 to throttle-valve switch term. 3
- From throttle-valve switch lead 9 (term. 18) to multiple plug term. 9

Eliminate contact resistances in the plug-in connections.

C8

Test chart for universal test adapter
Volvo 360 GLT

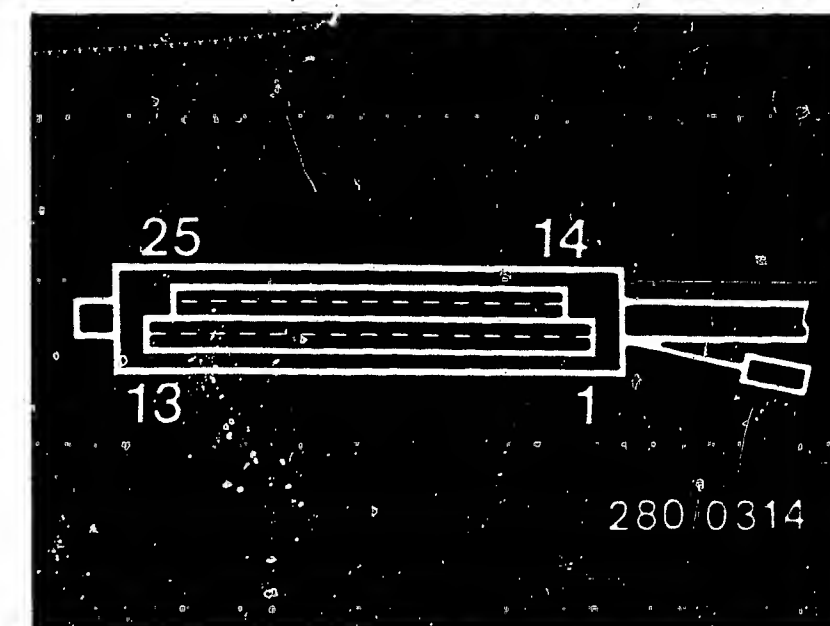


C9

Test chart for universal test adapter
Volvo 360 GLT

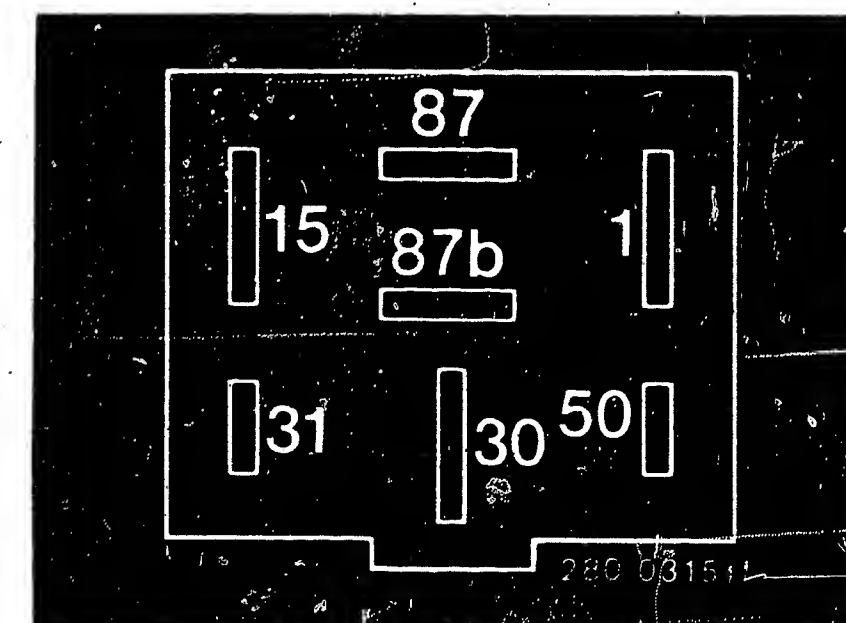


TEST STEP: 10		
Operation		Reading
Program switch position "V":	↓ 18	Multimeter must indicate
Program switch position "Ω":		7.0...9.5 Ω at + 20° C
Measuring equipment: Multimeter (Ω range)		and
Measuring range: Smallest measuring range		7.20...10.00 Ω at + 80° C.
Connection Test sockets blue		If reading O.K., continue testing with next test step.
Operation in vehicle:		
		Testing
		Component: Solenoid-operated injection valves
		Operation: Resistance of all 4 solenoid-operated injection valves (in parallel)
		Malfunction: Resistance outside tolerance



Top view of multiple plug

Control relay
(Top view of connection base)



Trouble-shooting:

For testing, remove wiring-harness plug from test adapter and use circuit diagram if necessary.

If reading too high: open circuit in valve coil or valve connector dropped off.

Check plug-in terminals for security.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From multiple plug term. 12 to the solenoid-operated injection valves.
- From the solenoid-operated injection valves to control relay term. 87.
- From the solenoid-operated injection valves to multiple plug term. 9.

Resistance measurement on solenoid-operated injection valve:

Ambient temperature (+15° C...+ 30° C): 15...17.5 Ω

Engine at normal op. temp. (approx. + 80° C): 17...20 Ω

Installation position of components:

1. Solenoid-operated injection valves: In engine compartment between engine block and intake manifold.

2. Control relay: At left-hand side at front in engine compartment near air-flow sensor.

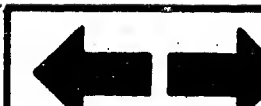
C10

Test chart for universal test adapter
Volvo 360 GLT



C11

Test chart for universal test adapter
Volvo 360 GLT



Testing with the universal test adapter is now finished.
It is now necessary to perform the fuel pressure test.
If a fault is found during a test the test must be
repeated after remedying the fault.

The fuel pressure test is described on Coordinates C 13
... D 3.

C12

Test chart for universal test adapter

Volvo 360 GLT



Fuel pressure test

Yes

Fuel pump operating? (Listen)
Control relay O.K.?

No

1. Test control relay

(Connector remains on while testing).

For testing, unscrew the control relay and turn round so that the connection base is accessible from below. Test the voltage supply. Switch on the ignition. Using voltmeter, measure battery voltage at term. 30, term. 15 and term. 50 (starting) to vehicle ground.

Set value 7...15 V.

If no voltage → test connecting leads.

2. Start engine

2.1 Test voltage at pump fuse

(Near battery two 8 A fuses).

2.2 Test voltage at control relay term.

87b:

If voltage at term. 87b → replace pump fuse.

If no voltage at term. 87b → replace control relay.

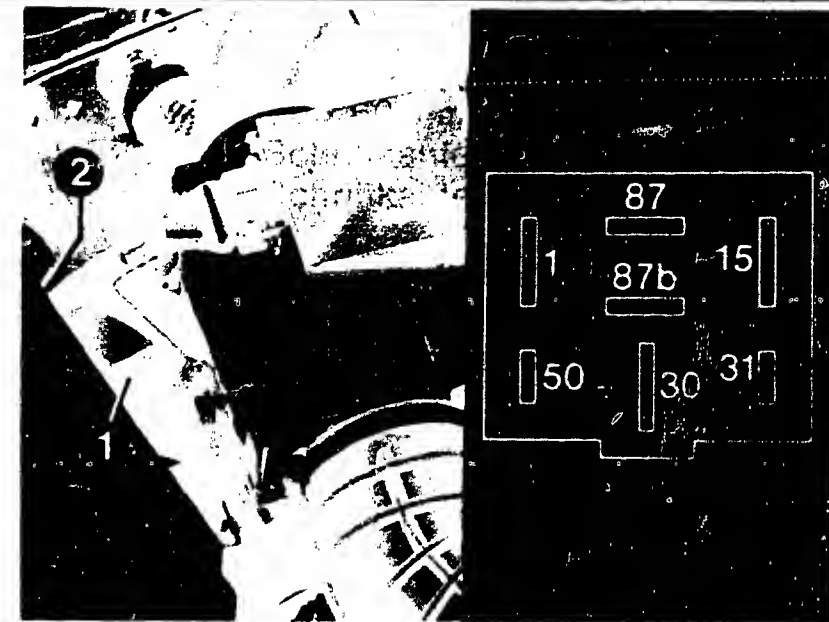
3. Ground connection of fuel pump O.K.?

The ground lead (light brown) runs from the electric fuel pump to the tank sender.

From the tank sender a ground lead runs to the central ground point on the fuse box (on the firewall in the engine compartment).

Yes

Continued on C 15/C 16



1 = Control relay

2 = Pump fuse

Connection base (viewed from below)

1 = Fuel delivery line

2 = Fuel filter

3 = Fuel intake line

4 = Electric fuel pump



C13

Fuel pressure test

Volvo 360 GLT



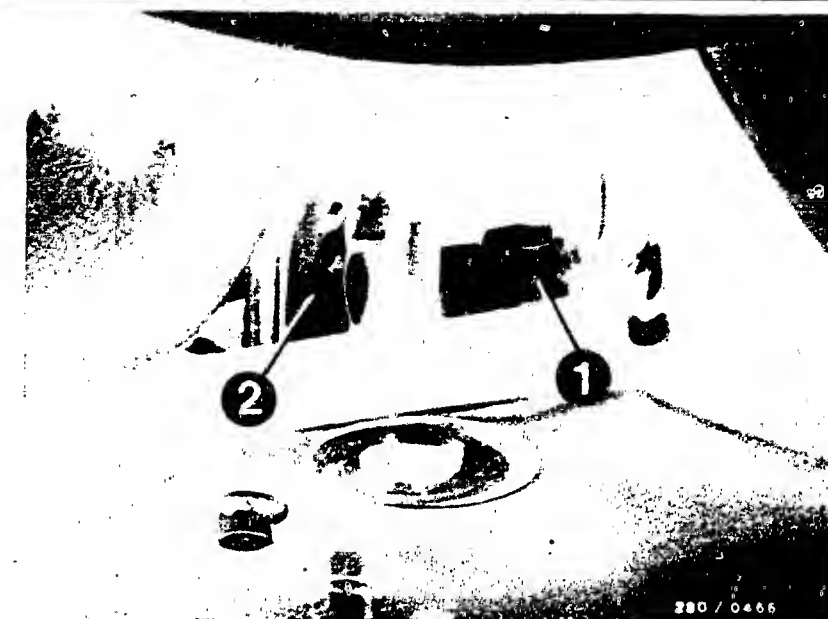
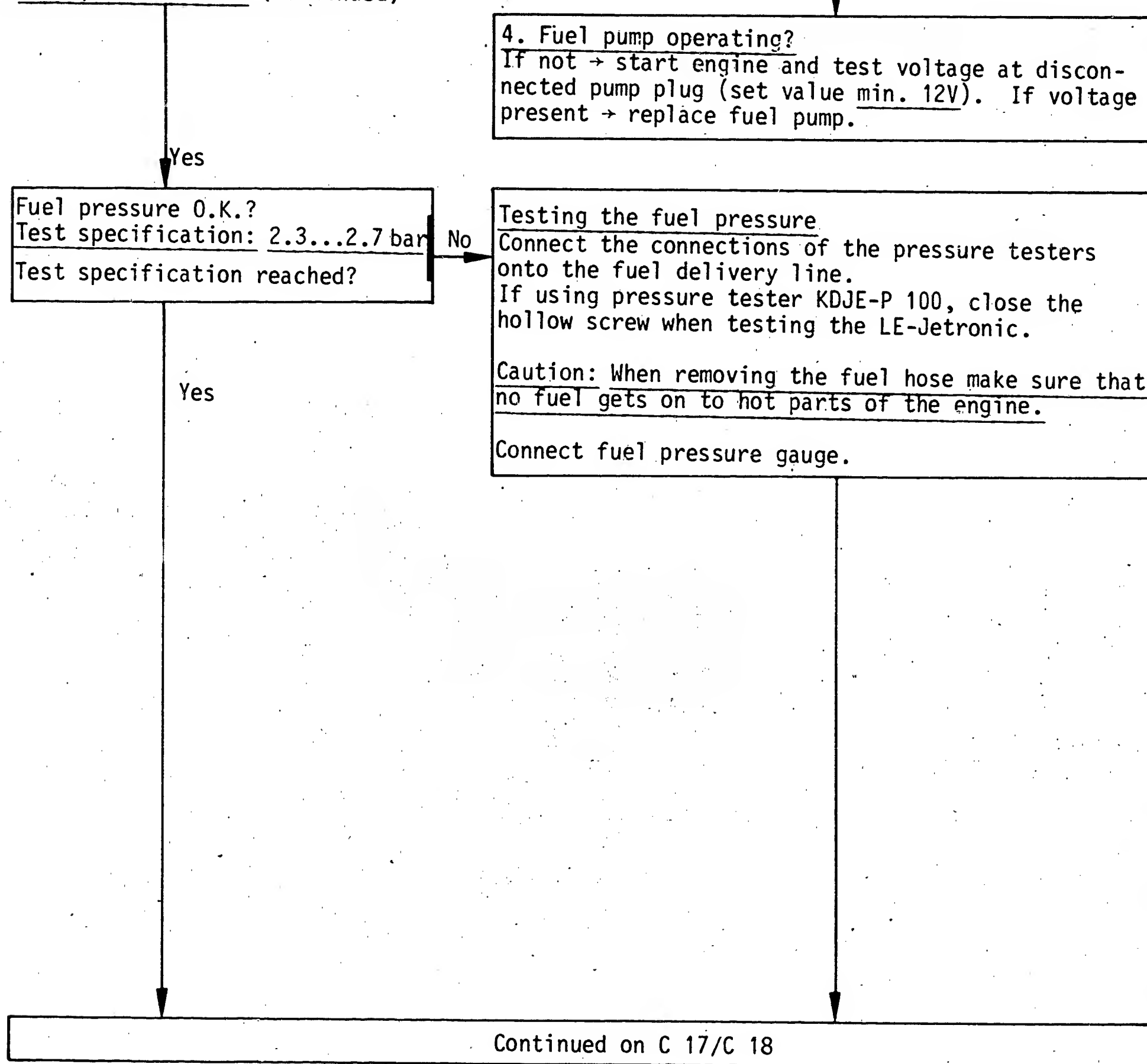
C14

Fuel pressure test

Volvo 360 GLT

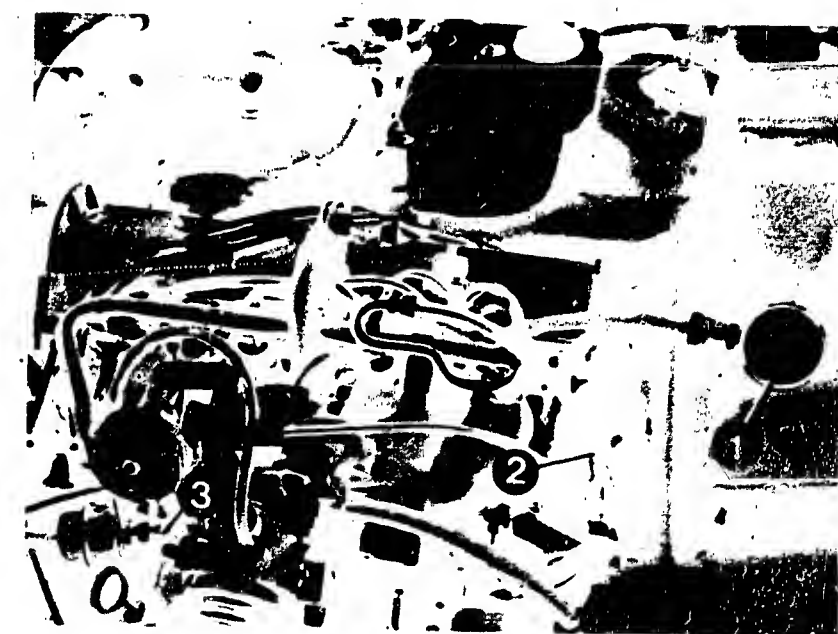


Fuel pressure test (continued)



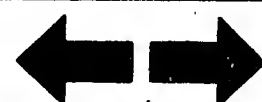
1 = Electrical connections
2 = Electric fuel pump

1 = Pressure gauge (pressure tester)
1 687 231 154
2 = Fuel delivery line
3 = Fuel return line



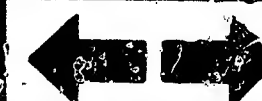
C15

Fuel pressure test
Volvo 360 GLT



C16

Fuel pressure test
Volvo 360 GLT

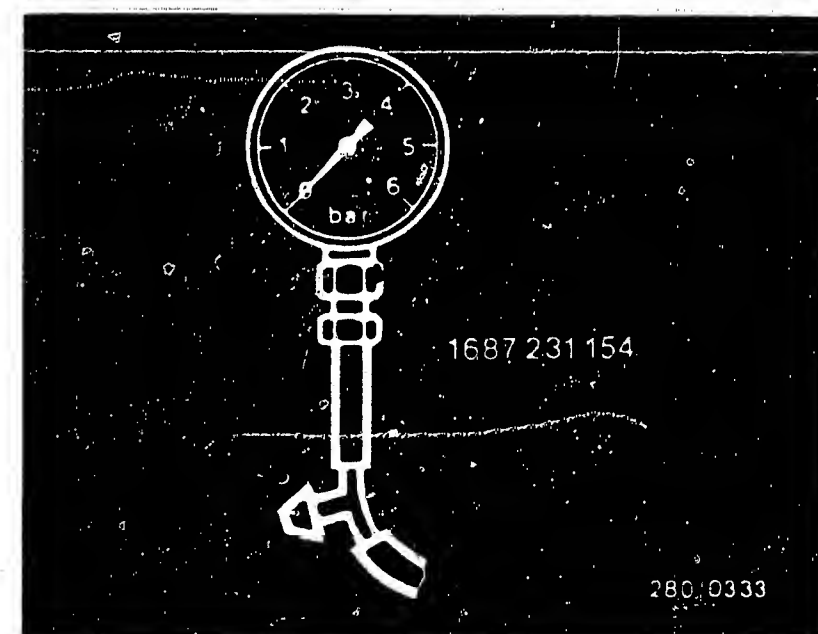
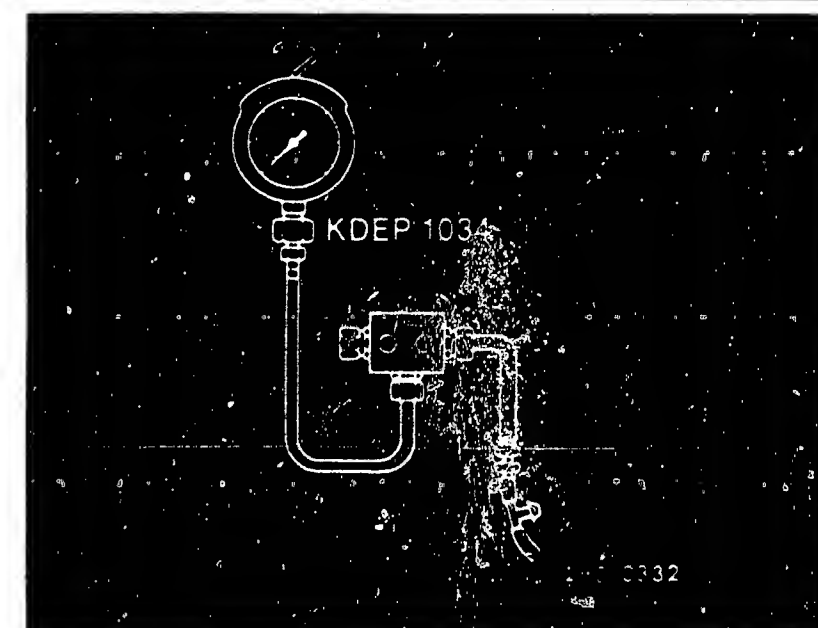
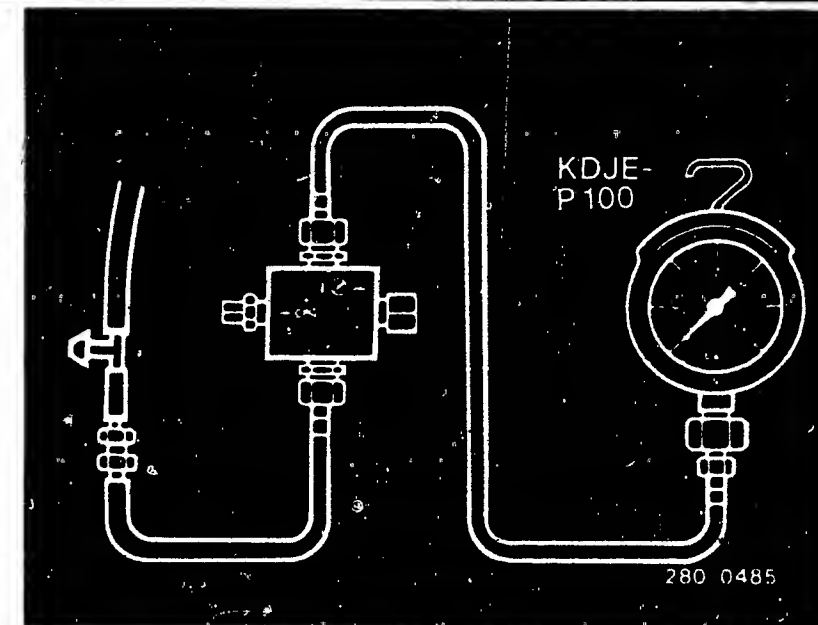


Fuel pressure test (continued)

Unscrew fuel delivery line (at junction on fuel-distribution pipe). Plug Y-connection piece of pressure tester onto hose to fuel-distribution pipe. Plug hose of pressure tester onto fuel delivery line. Make sure there are no leaks.

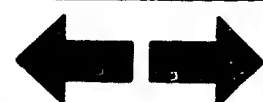
Yes

Continued on C 19/C 20



C17

Fuel pressure test
Volvo 360 GLT



C18

Fuel pressure test
Volvo 360 GLT



Fuel pressure test (continued)

Yes

Remove the control relay. Fit a jumper into the connection base between term. 87b and term. 30. Fuel pump must operate.
Fuel pump pressure: 2.3...2.7 bar

Caution!

Remove the jumper and fit the control relay in position.

Let engine idle.

Fuel pump pressure: approx. 2.0 bar

Testing the pressure regulator

Remove the control relay and fit a jumper into the connection base between term. 87b and term. 30. Electric fuel pump must operate.

Fuel pump pressure: 2.3...2.7 bar

Fuel pressure of 2.3 bar not reached:

1. Slowly pinch off fuel return line: (caution: do not load pressure gauge above 6 bar).

Pressure rises above 4 bar → replace pressure regulator.

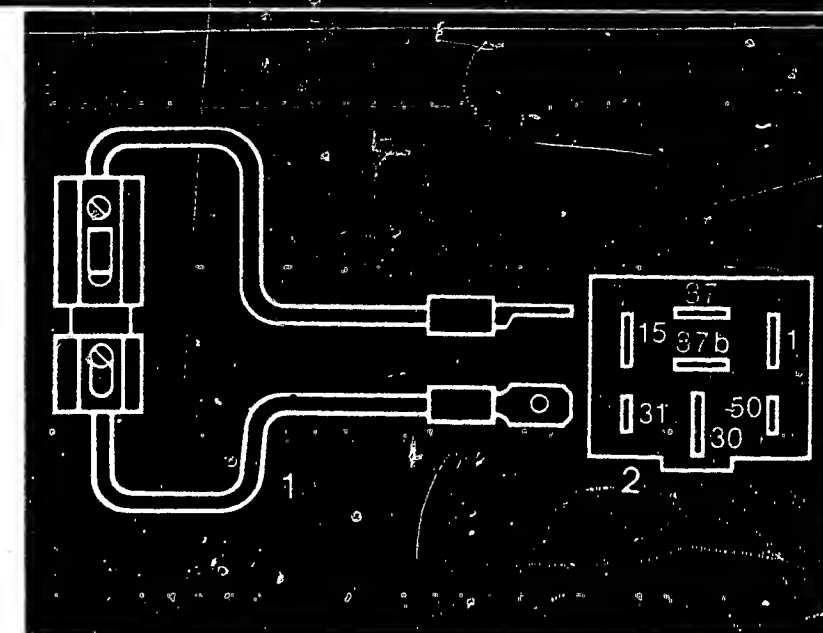
Pressure remains below 4 bar →

The fuel pressure quickly drops after engine has been switched off.

Leaks on following components:

- Pressure regulator (diaphragm)
- Start valve (needle seat, seal porous, valve not closing properly)
- Solenoid-operated injection valves (needle seat, valve not closing properly)
- Electric fuel pump (non-return valve leaking)

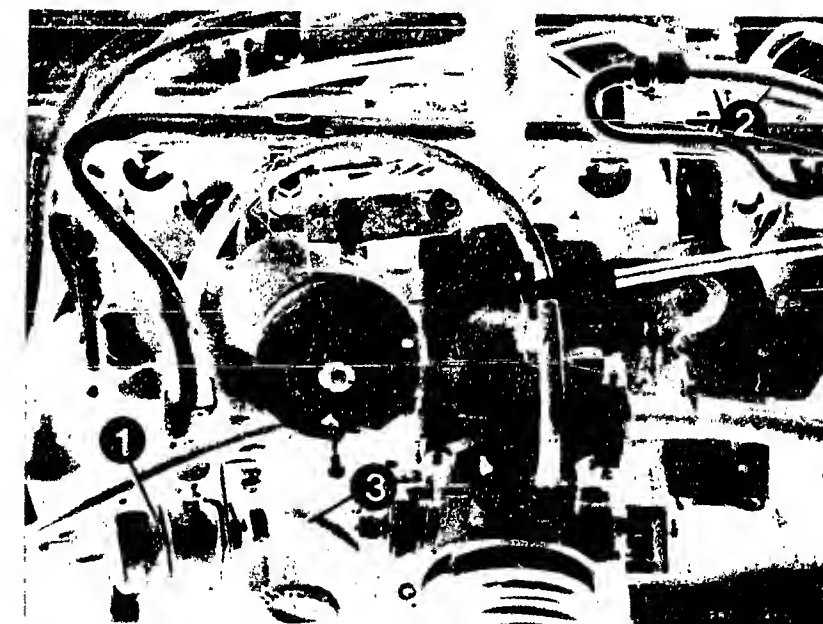
Continued on C 21/C22



Jumper (user-fabricated)

- 1 = Fuse holder with 10 A fuse
- 2 = Top view of connection base

- 1 = Pressure regulator
- 2 = Fuel delivery line
- 3 = Fuel return line



C19

Fuel pressure test
Volvo 360 GLT



C20

Fuel pressure test
Volvo 360 glt



Fuel pressure test (continued)

Yes

Repairing the non-return valve:

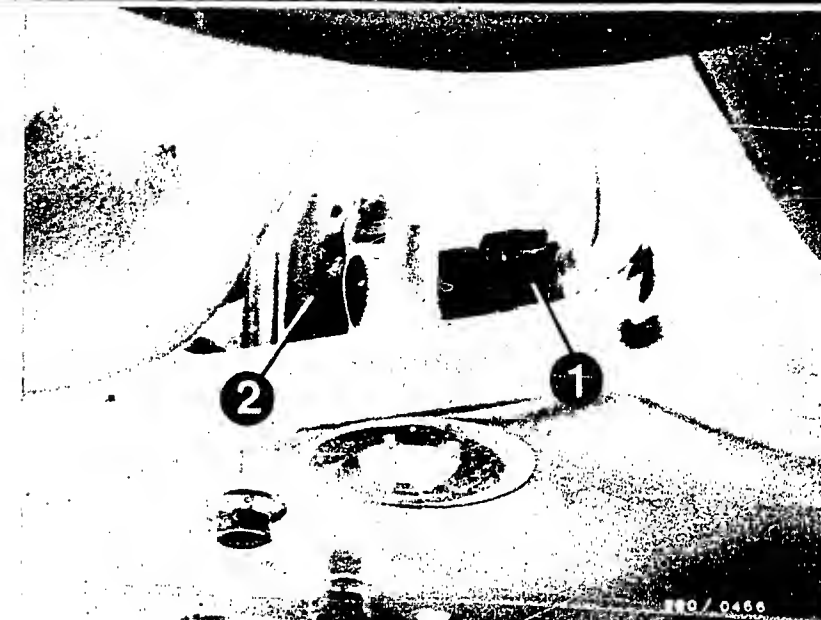
Parts set consisting of non-return valve and seal ring with No. 1 587 010 007 for pump 0 580 464 022. Loosen the non-return valve using an open-end wrench AF 17.

Caution!

Tightening torque 10...16 Nm.
Catch any escaping fuel.

- Fuel lines (joints, O-rings).

If the fault has not been eliminated the fuel pump must be replaced.

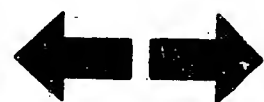


1 = Electrical connections
2 = Electric fuel pump

Continued on C 23/C 24

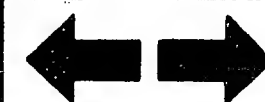
C21

Fuel pressure test
Volvo 360 GLT



C22

Fuel pressure test
Volvo 360 GLT



Fuel pressure test (continued)

Yes

2. Check fuel delivery line and fuel filter for throughflow.

3. Strainer in tank clogged.

4. Corrosion in tank.

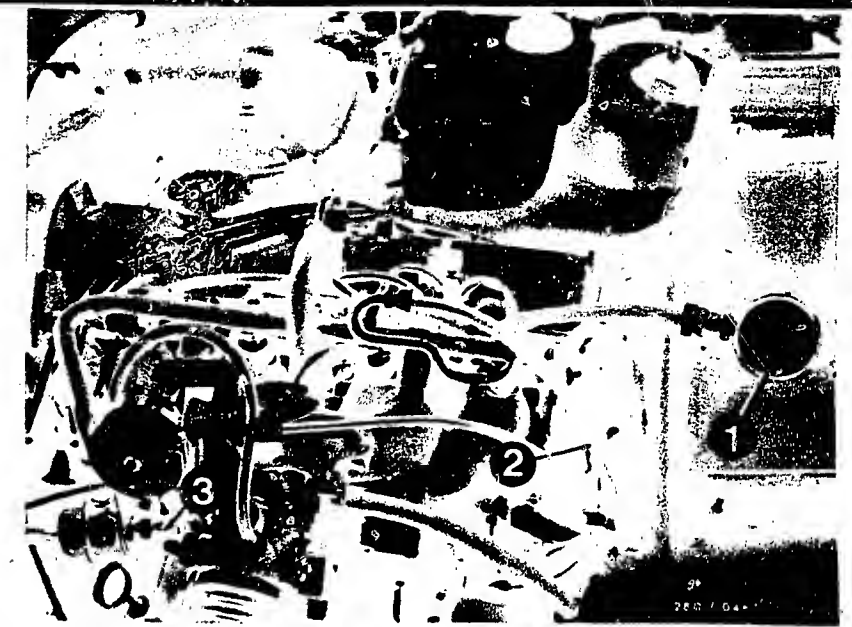
Fuel pressure of 2.7 bar exceeded:

1. Fuel return line clogged or pinched.

2. Replace pressure regulator.

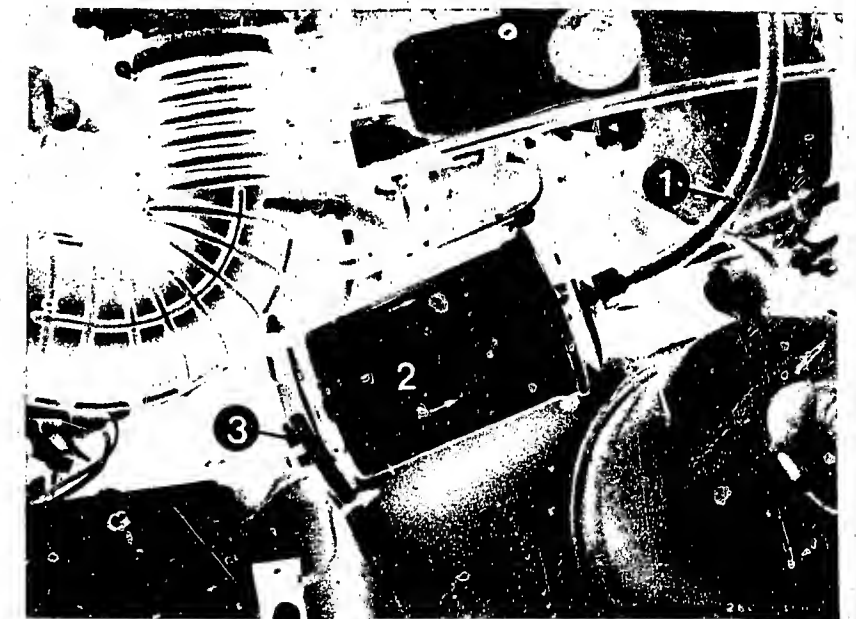
Caution!

Be sure to remove jumper after testing is completed and to reconnect control relay.



- 1 = Pressure gauge
(Pressure tester 1 687 231 154)
- 2 = Fuel delivery line
- 3 = Fuel return line

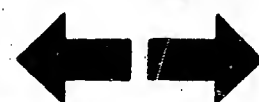
- 1 = Fuel delivery line
- 2 = Fuel filter
- 3 = Fuel delivery line from electric fuel pump



Continued on D 1/D 2

C23

Fuel pressure test
Volvo 360 GLT



C24

Fuel pressure test
Volvo 360 GLT



Fuel pressure test

Does fuel pressure remain constant after engine has started?

No

Check control relay:

Using special input, connect motortester to control relay term. 1 and ground and start engine. Are voltage peaks visible on the oscilloscope? If not, test lead from control relay to ignition coil term. 1 for continuity using ohmmeter. Set value: approx. 0 Ω .

If O.K., check ignition system.

Further trouble-shooting:

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- Lead 28 from control relay term. 87b to pump fuse, electric fuel pump and ground lead of electric fuel pump.

Also clean terminals and eliminate loose contacts.

The fuel pressure drops quickly after stopping the engine:

Check the following components for leaks:

- Pressure regulator (diaphragm)
- Start valve (needle seat, porous seal, valve not closing properly).
- Injection valves (needle seat, valve not closing properly).
- Electric fuel pump (non-return valve leaking).

Repair: Parts set consisting of

- Non-return valve and seal ring with No. 1 587 010 007 for pump 0 580 464 022.

Loosen the non-return valve using open-end wrench AF 17.

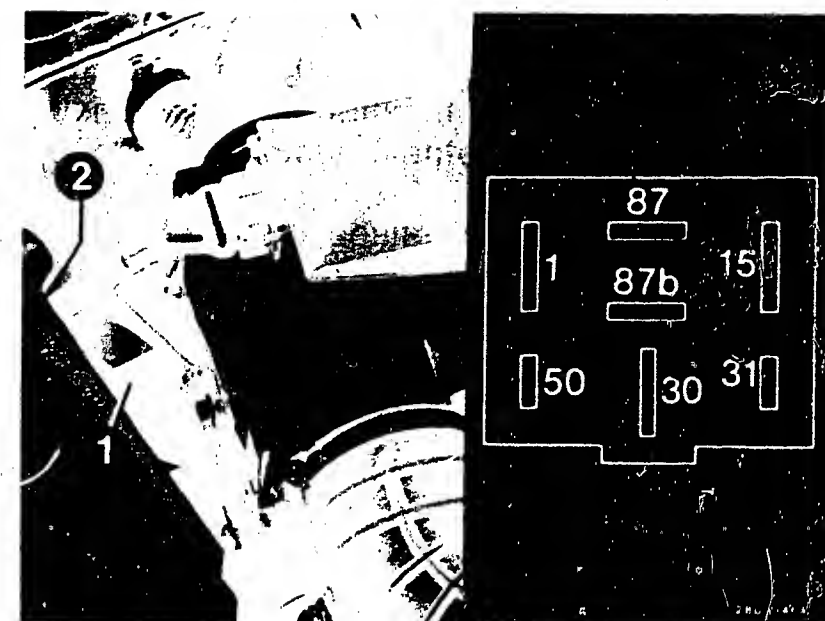
Caution: Tightening torque 10...16 Nm.

Catch any escaping fuel.

- Fuel lines (O-ring joints).

Yes

Continued on D 3



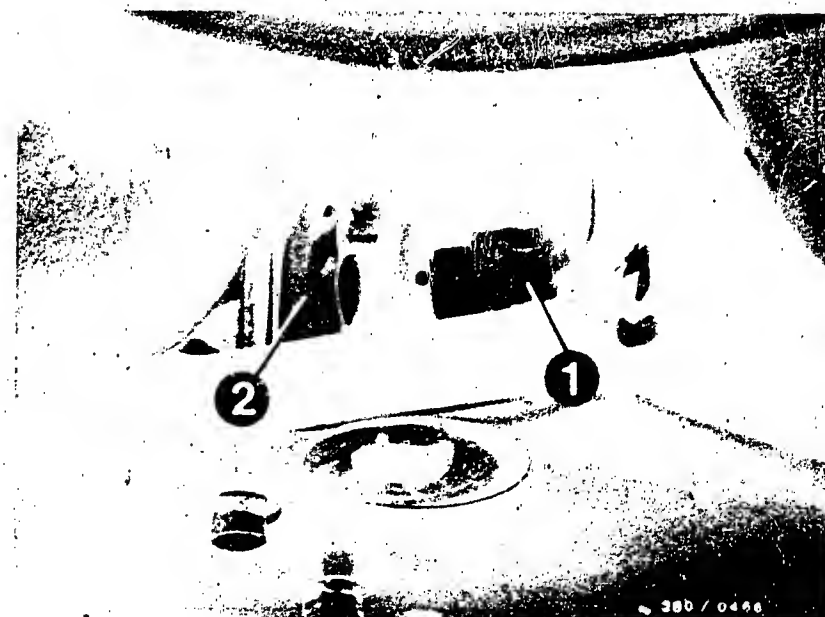
1 = Control relay

2 = Pump fuse

Connection base (viewed from below)

1 = Electrical connections

2 = Electric fuel pump



D1

Fuel pressure test

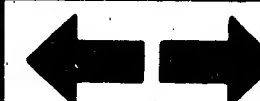
Volvo 360 GLT



D2

Fuel pressure test

Volvo 360 GLT



Fuel pressure test (continued)

The fuel pressure test is now finished. If the fault has not been found or if you require further information and instructions on how to remedy the fault, continue with the trouble-shooting program of your choice.

Detailed trouble-shooting (Coordinate B 3)

Direct trouble-shooting (Coordinate B 5)

D3

Fuel pressure test

Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.

2. The middle row contains descriptions of the testing and adjustment operations on the components.

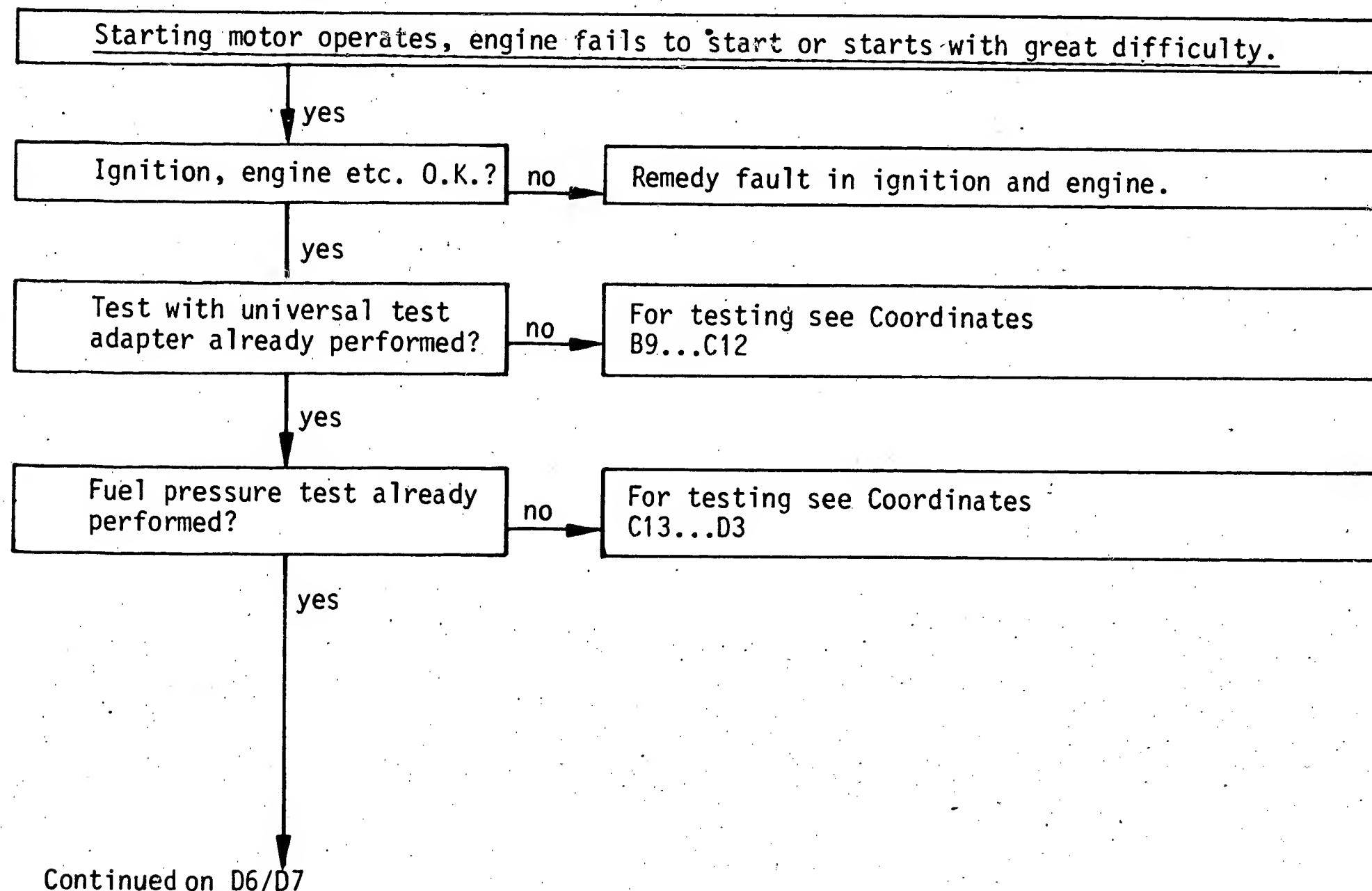
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

TROUBLE-SHOOTING START:



D4

Engine fails to start
Volvo 360 GLT



D5

Engine fails to start
Volvo 360 GLT



Starting motor operates engine fails to start or starts only with great difficulty
(continued)

Start valve O.K.?

No

Functional test:

Test power supply to start valve when starting.
To do this, remove plug from start valve and connect voltmeter to term. 30 and term. 29/term 4 of start valve plug.

1. Coolant at ambient temperature (+15°C...+30°C):
Voltage reading min. 6 V

2. Coolant temperature with engine at normal op.
temp. (approx. +80° C):
Voltage reading approx. 0 V

Test the following Leads for continuity using ohmmeter.

Set value: approx. 0 Ω

- Lead from term. 30 on start valve to thermo-time switch term. W.
- Lead from term. 29 on start valve to thermo-time switch term. G.
- Lead from term. 4 control unit to control relay term. 50.

Test ground connection of thermo-time switch

Electrical test of start valve:

Connect ohmmeter to start valve term. 29 and term. 30: Set value: approx. 4 Ω

Mechanical test of start valve:

Remove start valve from intake manifold and hold in a container.
(Caution! Fire hazard!). When starting at ambient temperature (+15° C...+30° C) the start valve must squirt fuel (max. 8 sec.)

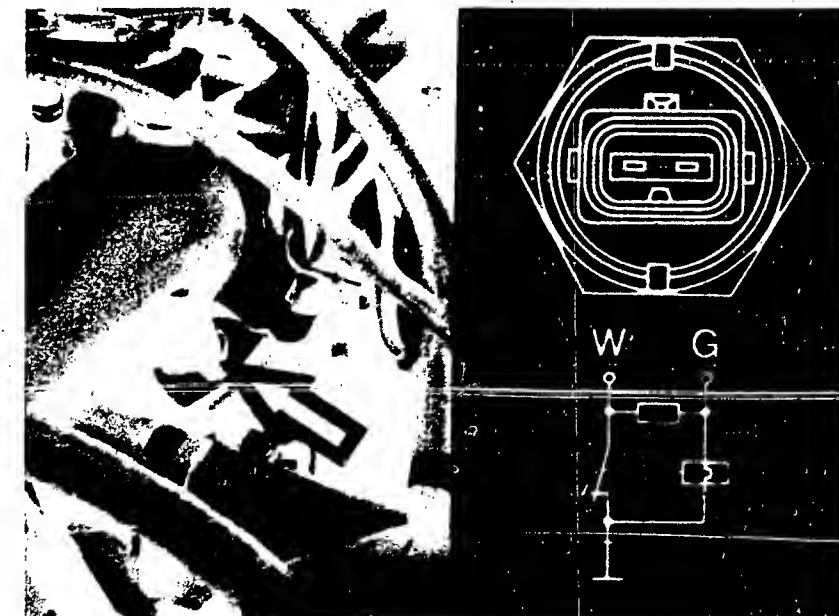
Yes

Continued on D 8/D 9



Arrow = Start valve

Arrow = Thermo-time switch
(Brown plug)



D6

Engine fails to start

Volvo 360 GLT



D7

Engine fails to start

Volvo 360 GLT



Starting motor operates, engine fails to start or starts only with great difficulty (continued)

With the engine at normal operating temperature (+80°C) the start valve must not squirt. With the ignition on and the pressure built up the start valve must likewise not squirt. Carry out squirt test when engine is at operating temperature (+80°C) as follows: Remove plug from thermo-time switch and ground term. W. Start engine

Testing the start valve for leaks

1. When installed:

Pinch off the fuel delivery line at the start valve. If engine then runs smoothly, replace start valve.

2. When removed:

Remove the start valve (caution! fire hazard!). Fuel lines and electric leads remain connected (place collector vessel under the start valve). Build up the fuel pressure (remove control relay and fit jumper into connection base between term. 87b and term. 30).

Test specification:

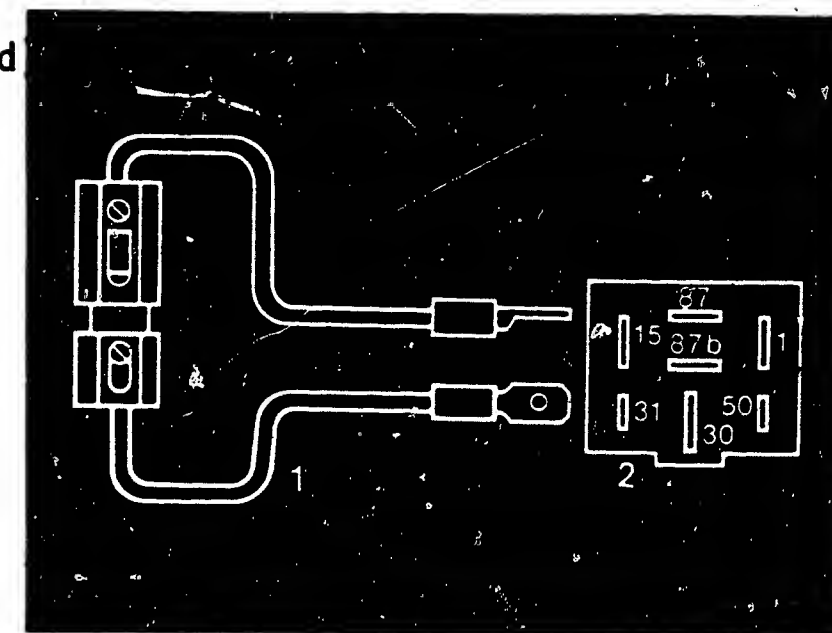
Within one minute max. 1 drop may form at the mouth of the valve.

Caution!

The jumper must be removed again after test is completed and the control relay must be fitted in position.

Yes

Continued on D 10/D 11



Jumper (user-fabricated)

1 = Fuse holder with 10A fuse

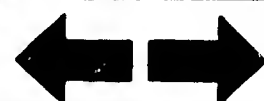
2 = Top view of connection base

Arrow = Start valve



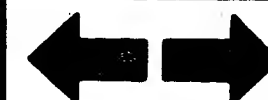
D8

Engine fails to start
Volvo 360 GLT



D9

Engine fails to start
Volvo 360 GLT



Starting motor operates, engine fails to start or starts only with great difficulty (continued)

Thermo-time switch O.K.?

no

Electrical test:

Test thermo-time switch 35°C/7.5 sec. as follows:
Remove plug and measure resistance directly at
thermo-time switch using ohmmeter.

1. Between term. "W" and ground at ambient
temperature (below +30°C): 25...40 Ω
at engine temperature (above +40°C): 50...80 Ω

2. Between term. "W" and ground at ambient
temperature (below +30°C): 0 Ω
at engine temperature (above +40°C): 100...160 Ω

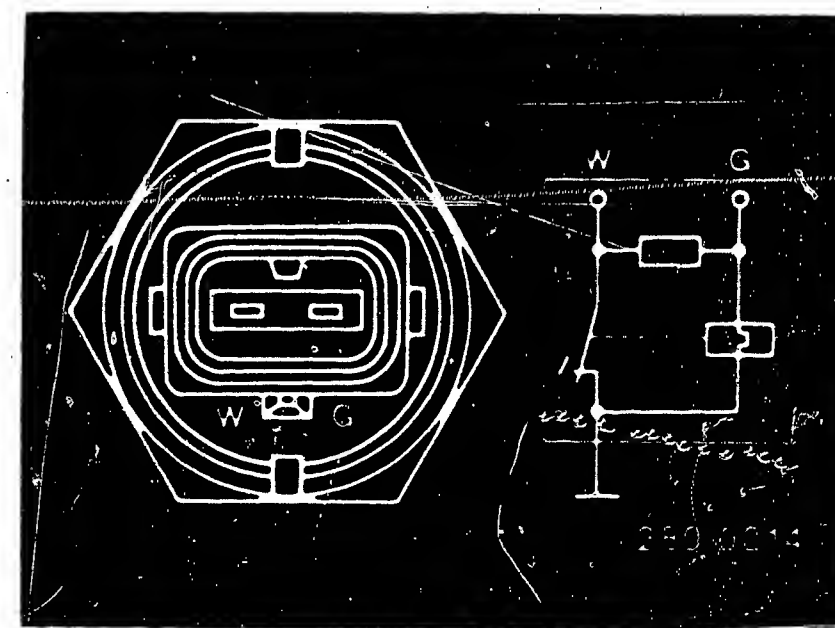
3. Between term. "G" and "W" at ambient
temperature (below +30°C): 25...40 Ω
at engine temperature (above +40°C): 50...80 Ω

yes



Arrow = Thermo-time switch
(brown plug)

Continued on D 12/D 13



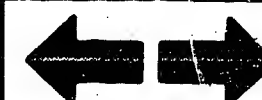
D 10

Engine fails to start
Volvo 360 GLT



D 11

Engine fails to start
Volvo 360 GLT



Starting motor operates, engine fails to start or starts only with great difficulty (continued)

Auxiliary-air device tested?
(mechanically O.K.?)

no

Testing:

1. Visual examination of auxiliary-air device:

Remove hoses and look down (possibly using a small mirror). When cold the device must be open; when the engine is warm it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:

With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If not, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test:

Remove plug from auxiliary-air device. Connect ohmmeter to both terminals of auxiliary-air device.

Test specification: 35...70 Ω

If the reading is outside tolerance, replace auxiliary-air device.

yes



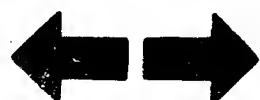
Arrow = Auxiliary-air device

Continued on D 14/D 15

D 12

Engine fails to start

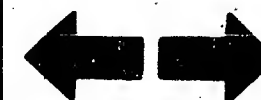
Volvo 360 GLT



D 13

Engine fails to start

Volvo 360 GLT



Starting motor operates, engine fails to start or starts only with great difficulty (continued)

Air-flow sensor O.K.?

no

Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.

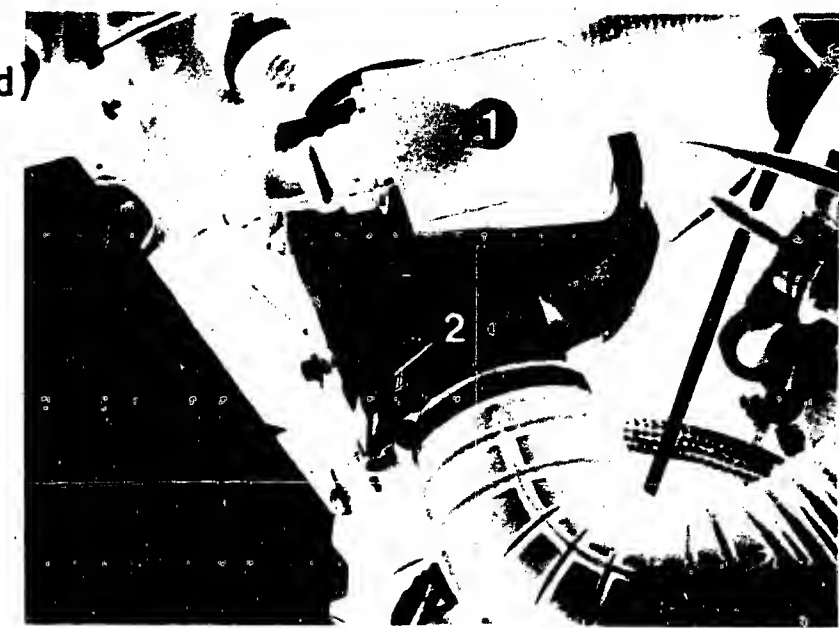
Test specification: $160...300 \Omega$
Connect ohmmeter to term. 7 and term. 5 of air-flow sensor. Deflect air-flow sensor flap.

Test specification: $60...1000 \Omega$
Sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. Replace air-flow sensor.

Caution:

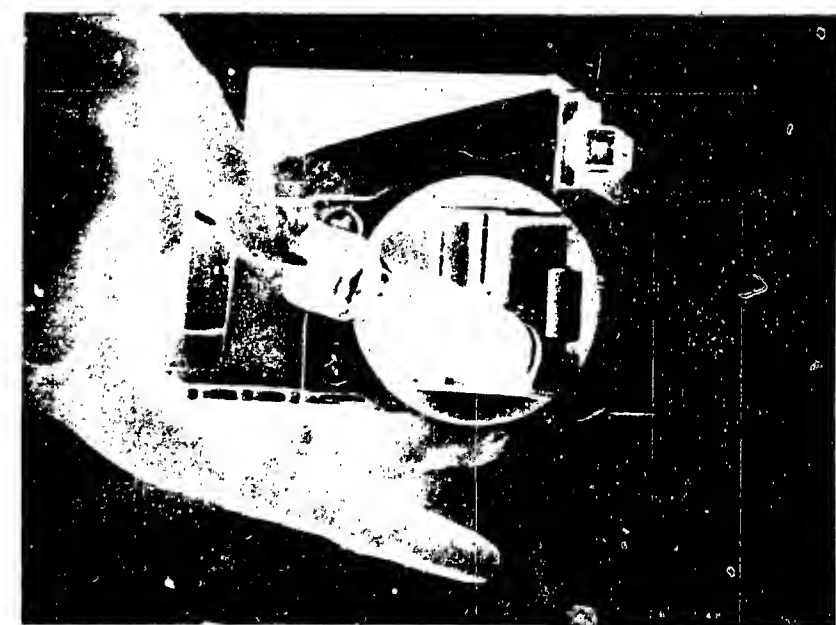
After testing is completed, refit the hose between air filter and air-flow sensor. Tighten hose clamp securely.

yes



- 1 = Air-flow sensor
- 2 = Bypass screw (CO adjustment)
Turning in clockwise direction
= richer mixture

Opening the air-flow sensor flap



Continued on D 16/D 17

D14

Engine fails to start
Volvo 360 GLT



D15

Engine fails to start
Volvo 360 GLT



Starting motor operates, engine fails to start or starts only with great difficulty (continued)

Are all hose lines and electric leads securely attached? Visual examination.
Is the air-intake system leak-tight?

no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

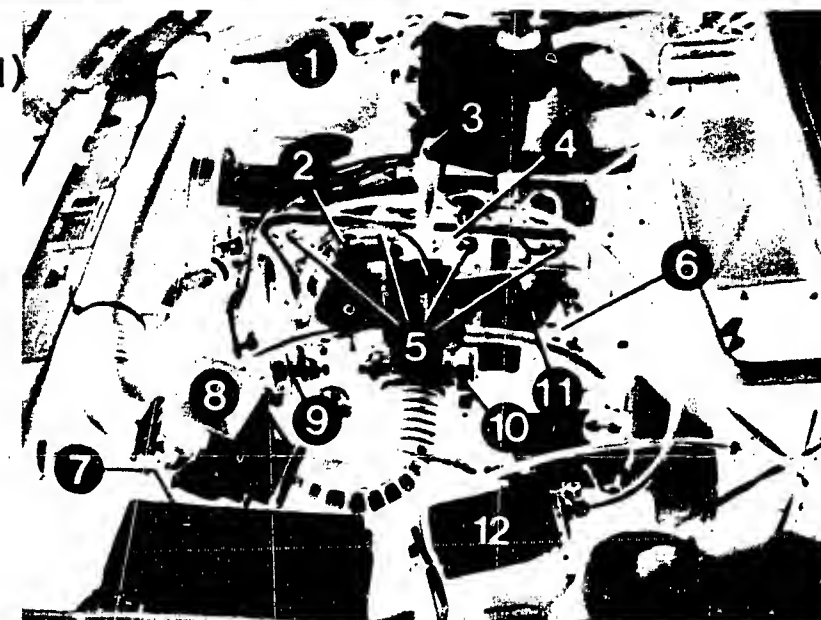
Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electric contacts for loose connection.

yes

Continued on D 18/D 19



- 1 = Air filter
- 2 = Ground terminal
- 3 = Auxiliary-air device
- 4 = Start valve
- 5 = Injection valves
- 6 = Thermo-time switch
- 7 = Control relay
- 8 = Air-flow sensor
- 9 = Pressure regulator
- 10 = Throttle-valve switch
- 11 = Temperature sensor II (water)
- 12 = Fuel filter

D16

Engine fails to start

Volvo 360 GLT



D17

Engine fails to start

Volvo 360 GLT



Starting motor operates, engine fails to start or starts only with great difficulty (continued)

Testing completed for customer complaint

"Starting motor operates, engine fails to start or starts only with great difficulty"

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinate B 3/B 4).
- Engine not mechanically O.K. (compression, valve setting, valve timing, worn camshaft).

D 18

Engine fails to start

Volvo 360 GLT



D 19

Engine fails to start

Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

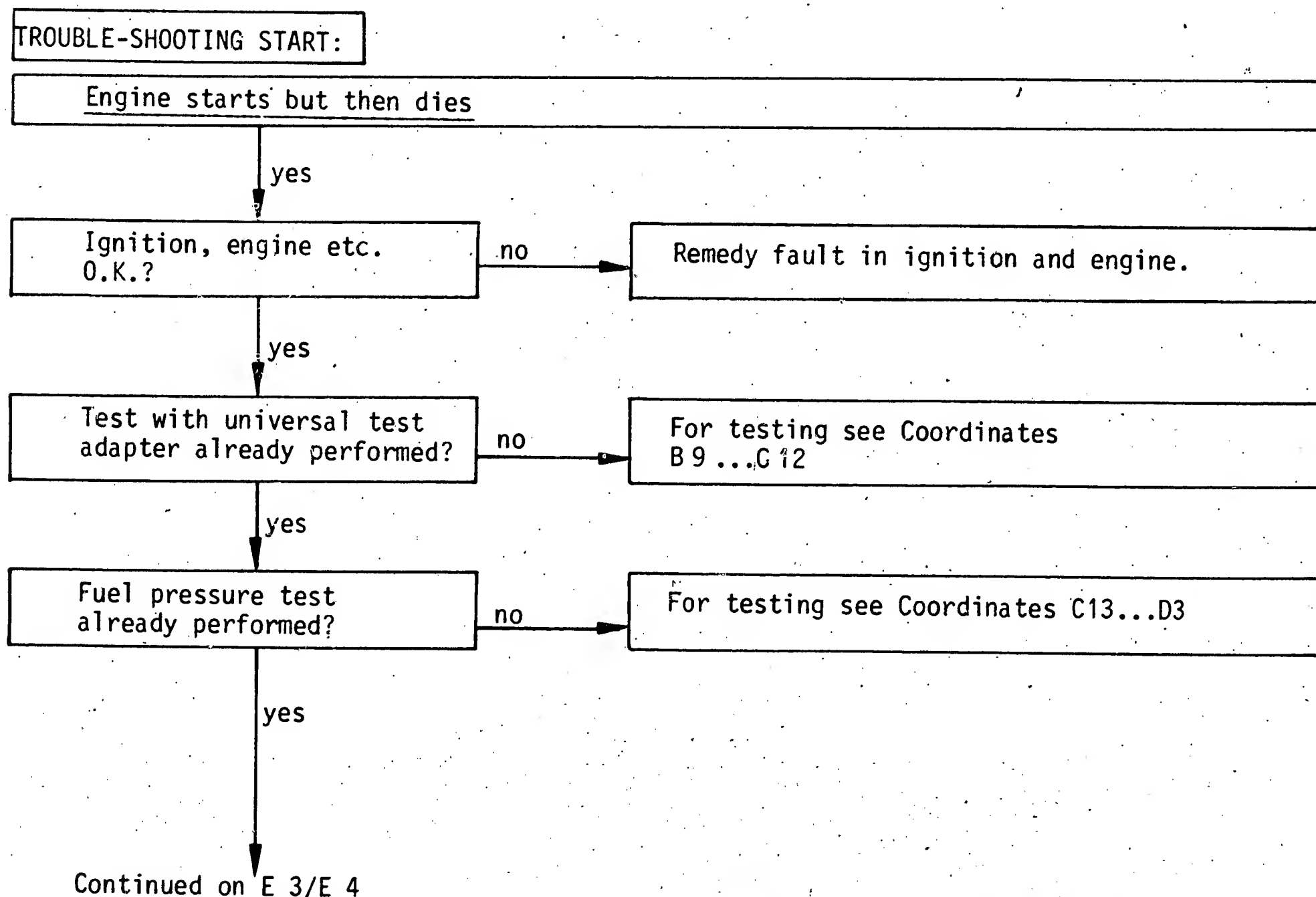
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



E1

Engine starts but then dies

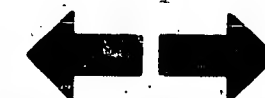
Volvo 360 GLT



E2

Engine starts but then dies

Volvo 360 GLT



Engine starts but then dies (continued)

Start valve O.K.?
(leak test)

no

Testing the start valve for leaks:

1. When installed:

Pinch off the fuel delivery line at the start valve. If engine then runs smoothly, replace start valve.

2. When removed:

Remove the start valve (caution! fire hazard!). Fuel lines and electric leads remain connected (place collector vessel under the start valve). Build up the fuel pressure (remove control relay and fit jumper into connection base between term. 87b and term. 30).

Test specification:

Within one minute max. 1 drop may form at the mouth of the valve.

Caution!

The jumper must be removed again after test is completed and the control relay must be fitted in position.

yes

Continued on E 5/E 6

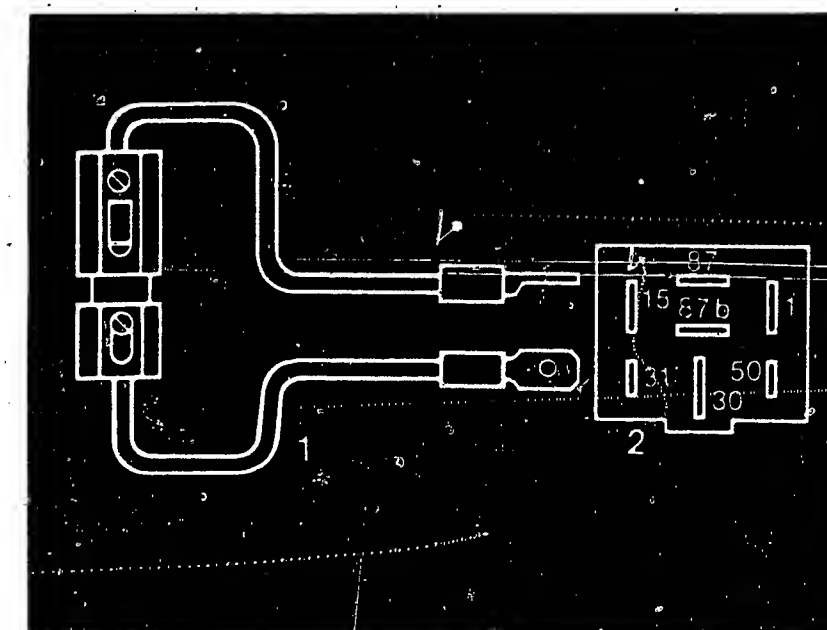


Arrow = Start valve

Jumper (user-fabricated)

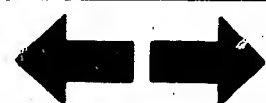
1 = Fuse holder with 10A fuse

2 = Top view of connection base



E3

Engine starts but then dies
Volvo 360 GLT



E4

Engine starts but then dies
Volvo 360 GLT



Engine starts but then dies (continued)

Auxiliary-air device tested?
(mechanically O.K.?)

no

Testing:
1. Visual examination of auxiliary-air device:
Remove hoses and look down, using a small mirror if necessary. When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

yes

Auxiliary-air device tested?
(continued)
Electrically O.K.?

no

Remove plug from auxiliary-air device. Connect ohmmeter to both terminals of auxiliary-air device:
Test specification: $35...70 \Omega$
If the reading is outside tolerance, replace auxiliary-air device.

yes

Continued on E 7/E 8



Arrow = Auxiliary-air device

E5

Engine starts but then dies
Volvo 360 GLT



E6

Engine starts but then dies
Volvo 360 GLT



Engine starts but then dies (continued)

Are all hose lines and electric leads securely attached? Visual examination.
Is the air-intake system leak-tight?

no

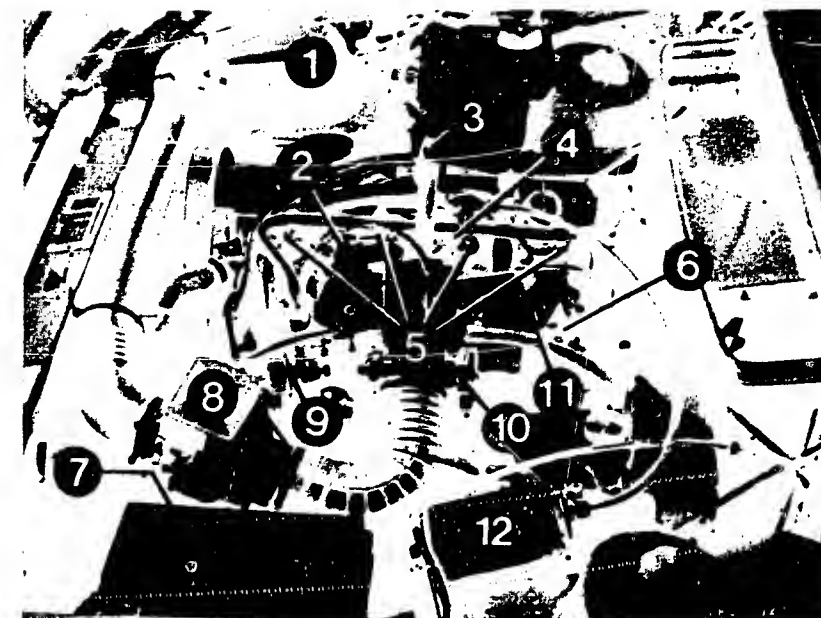
Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electric contacts for loose connection.

yes

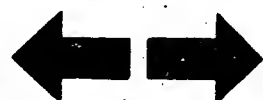


- 1 = Air filter
- 2 = Ground terminal
- 3 = Auxiliary-air device
- 4 = Start valve
- 5 = Injection valves
- 6 = Thermo-time switch
- 7 = Control relay
- 8 = Air-flow sensor
- 9 = Pressure regulator
- 10 = Throttle-valve switch
- 11 = Temperature sensor II (water)
- 12 = Fuel filter

Continued on E 9/E 10

E7

Engine starts but then dies
Volvo 360 GLT



E8

Engine starts but then dies
Volvo 360 GLT



Engine starts but then dies (continued)

Testing completed for customer complaint

"Engine starts but then dies"

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinate B3/B4).
- Engine not mechanically O.K. (compression, valve setting, valve timing, worn camshaft).

E9

Engine starts but then dies

Volvo 360 GLT



E10

Engine starts but then dies

Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.

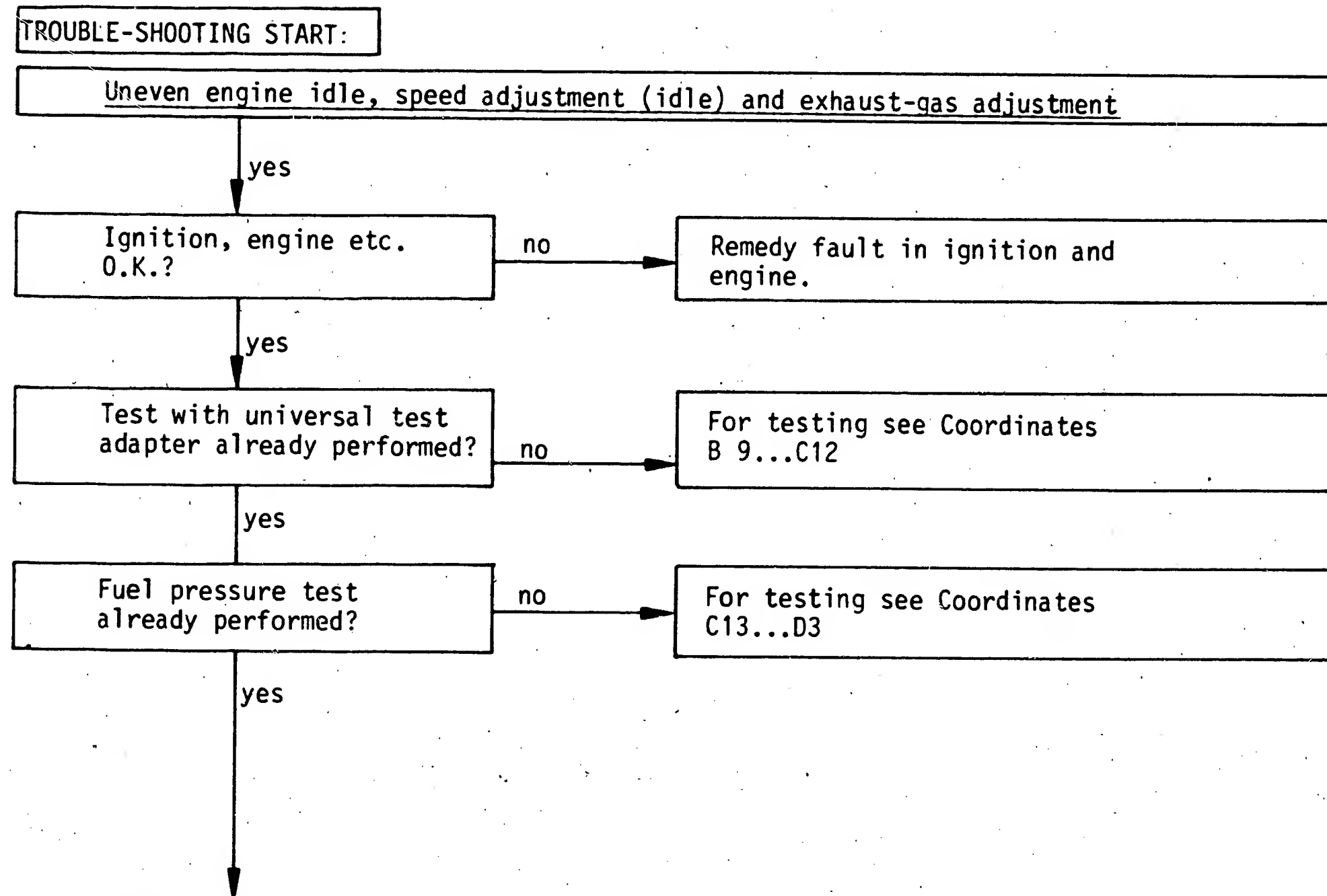
2. The middle row contains descriptions of the testing and adjustment operations on the components.

3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on E 13/E 14

E11

Uneven engine idle
Volvo 360 GLT



E12

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

Throttle valve closed?

No

Testing:

Throttle valve closed?

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Adjusting the throttle valve:

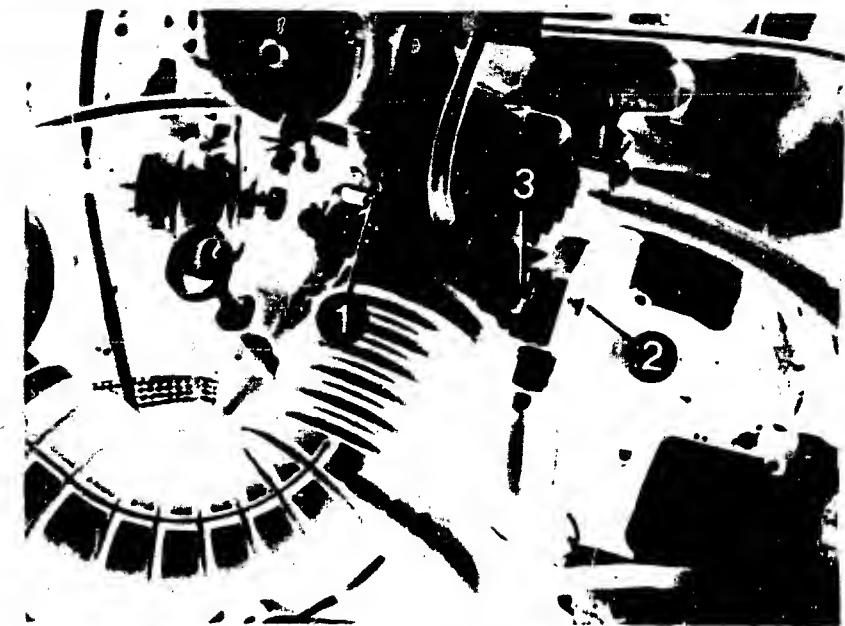
Slightly raise connecting bar so that throttle valve opens. Introduce a 0.05 mm feeler gauge on the top side between throttle valve and housing and release connecting bar. It must be possible to move the feeler gauge to and fro easily. Do the same with a 0.1 mm feeler gauge. It must not be possible to move this feeler gauge to and fro between throttle valve and housing. If necessary, adjust using adjusting screw.

Setting the throttle-valve switch:

Loosen both fastening screws. Firstly, turn throttle-valve switch in clockwise direction and then turn slowly in counterclockwise direction until a clicking noise can be heard. Secure the throttle-valve switch in this position. (The clicking noise is caused by a microswitch).

Yes

Continued on E 15/E 16



- 1 = Throttle-valve stop screw
- 2 = Throttle-valve switch
- 3 = Fastening screws

- 1 = Adjusting screw
- 2 = Connecting bar



E13

Uneven engine idle
Volvo 360 GLT



E14

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Start valve O.K.?

no

Testing the start valve for leaks

1. When installed

Pinch off the fuel delivery line at the start valve. If engine then runs smoothly, replace start valve.

2. When removed

Remove the start valve (caution! fire hazard!). Fuel lines and electric leads remain connected (place collector vessel under the start valve). Build up the fuel pressure (remove control relay and fit jumper into connection base between term. 87b and term. 30).

Test specification:

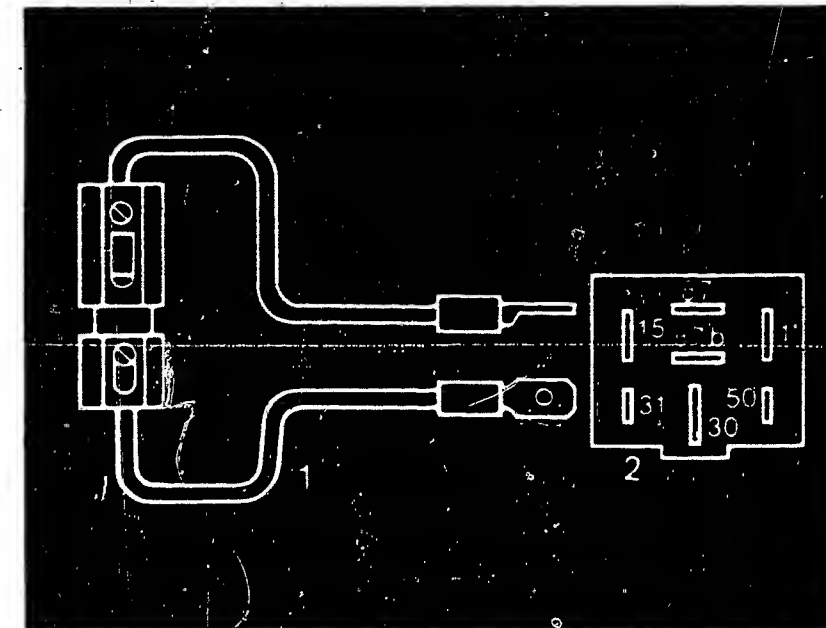
Within one minute max. 1 drop may form at the mouth of the valve.

Caution!

The jumper must be removed again after test is completed and the control relay must be fitted in position.

yes

Continued on E 17/E 18

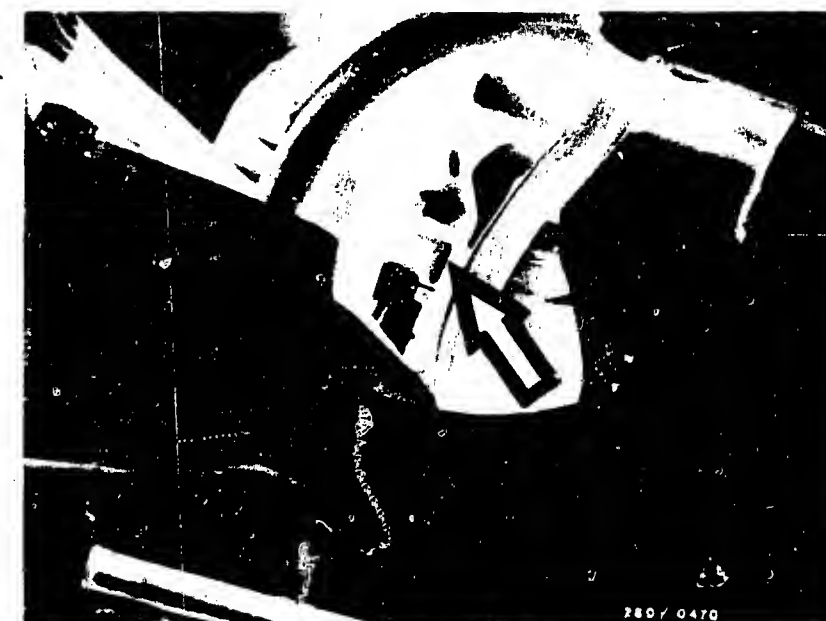


Jumper (user-fabricated)

1 = Fuse holder with 10A fuse

2 = Top view of connection base

Arrow = Start valve



E15

Uneven engine idle
Volvo 360 GLT



E16

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

CO and idle speed correctly
adjusted?

No

CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at
normal operating temperature and at idle speed.

Idle speed

Manually-shifted transmission: $850 \dots 950 \text{ min}^{-1}$

Automatic transmission (selector lever in position
"P"): $850 \dots 950 \text{ min}^{-1}$

CO setting: $0.5 \dots 2.0\% \text{ vol. CO}$

If CO concentration too high, turn bypass screw
(CO adjusting screw) in air-flow sensor half a
turn in a counterclockwise direction. Check engine
speed and CO concentration again. Carry out
adjustments in several steps. After adjusting,
use new plugs.

Only on Sweden version with Pulsair system
(secondary-air induction):

Idle speed: $850 \dots 950 \text{ min}^{-1}$

CO setting (engine at normal op. temp.)
with Pulsair system: $0.3 \dots 0.5\% \text{ by vol. CO}$

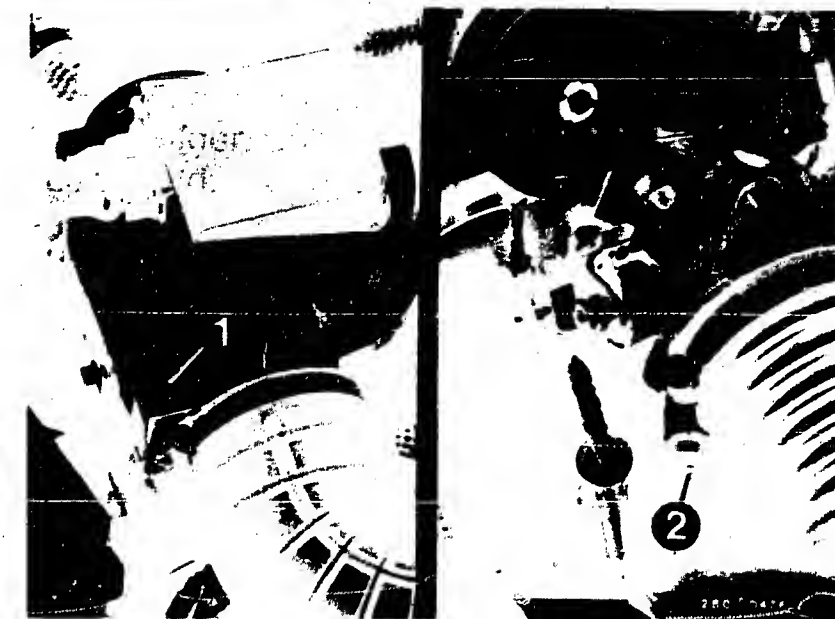
Pulsair system inoperative: $0.5 \dots 2.0\% \text{ by vol. CO}$

The secondary-air induction system must be rendered
inoperative for testing and adjusting the idle and
CO settings. To do this, remove hose between non-
return valve and air filter on air filter (arrow)
and seal off tight with a plug. If the vehicle is
operated in countries with less stringent exhaust-
emission legislation it is not necessary to shut
down the secondary-air induction system.

Yes

Can idle speed not be adjusted?

Yes

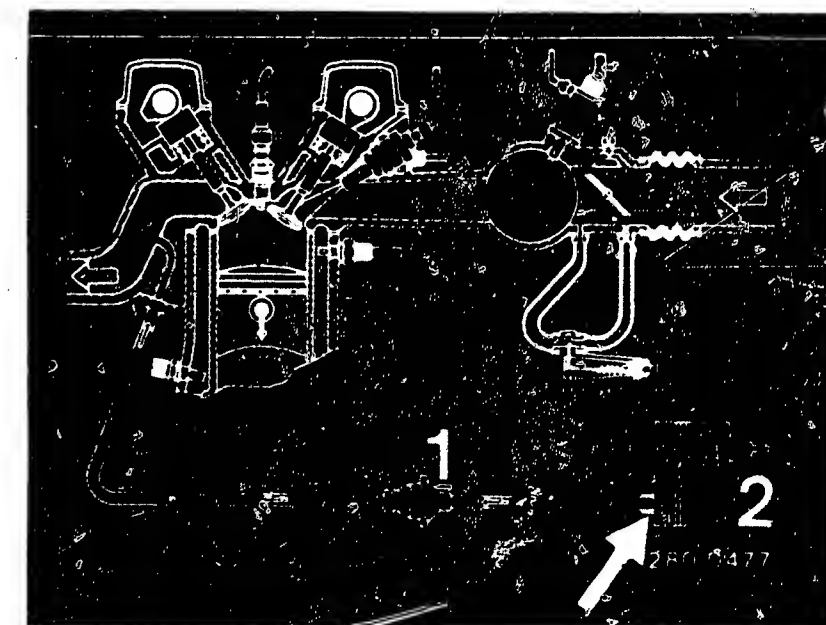


1 = CO adjusting screw

2 = Idle adjusting screw

1 = Non-return valve

2 = Air filter



Continued on E 19/E 20

E17

Uneven engine idle

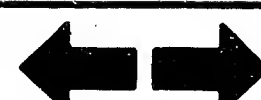
Volvo 360 GLT



E18

Uneven engine idle

Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Only on Sweden version with exhaust-gas recirculation (EGR):

The exhaust-gas recirculation system must be rendered inoperative when testing/adjusting the idle and CO settings by removing and sealing off the vacuum-control line (arrow) on the EGR valve. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the system.

Yes

Auxiliary-air device tested?
(mechanically O.K.?)

No

Testing:

1. Visual examination of auxiliary-air device:

When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device (remove hoses and look down, using a small mirror if necessary).

2. Functional test of auxiliary-air device:

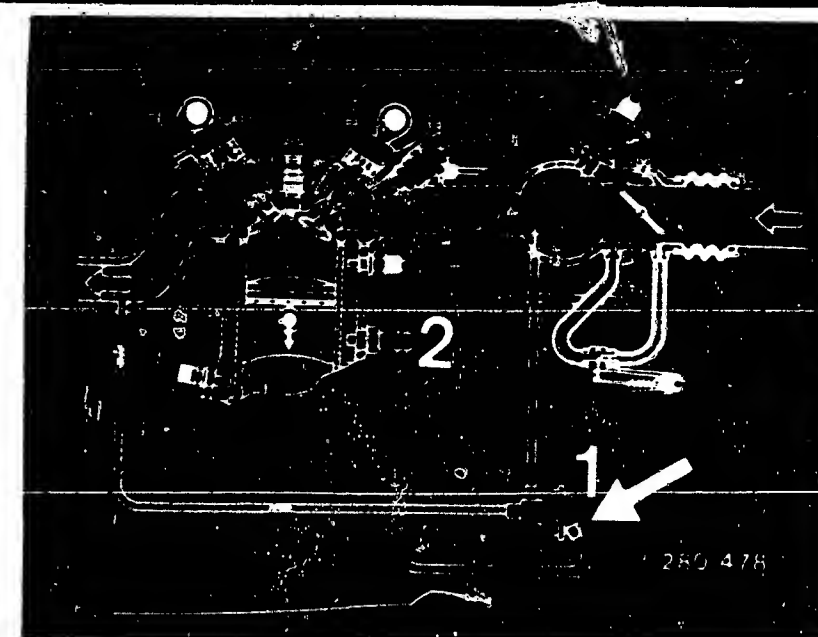
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test:

Remove plug from auxiliary-air device. Connect ohmmeter to both terminals of auxiliary-air device: Test specification: $35...70\ \Omega$
If reading outside tolerance, replace auxiliary-air device.

Yes

Continued on E 21/E 22



1 = EGR valve
2 = Thermo-valve

Arrow = Auxiliary-air device



E19

Uneven engine idle
Volvo 360 GLT



E20

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Thermo-time switch O.K.?

no

Electrical test:

Test thermo-time switch 35° C/7.5 sec. as follows:
Remove plug and measure resistance directly at thermo-time switch using ohmmeter.

1. Between term "G" and ground at ambient temperature (below +30° C): 25...40 Ω
at engine temperature (above +40° C): 50...80 Ω
2. Between term. "W" and ground at ambient temperature (below +30° C): 0 Ω
at engine temperature (above +40° C): 100...160 Ω
3. Between term. "G" and "W" at ambient temperature (below +30° C): 25...40 Ω
at engine temperature (above +40° C): 50...80 Ω

yes

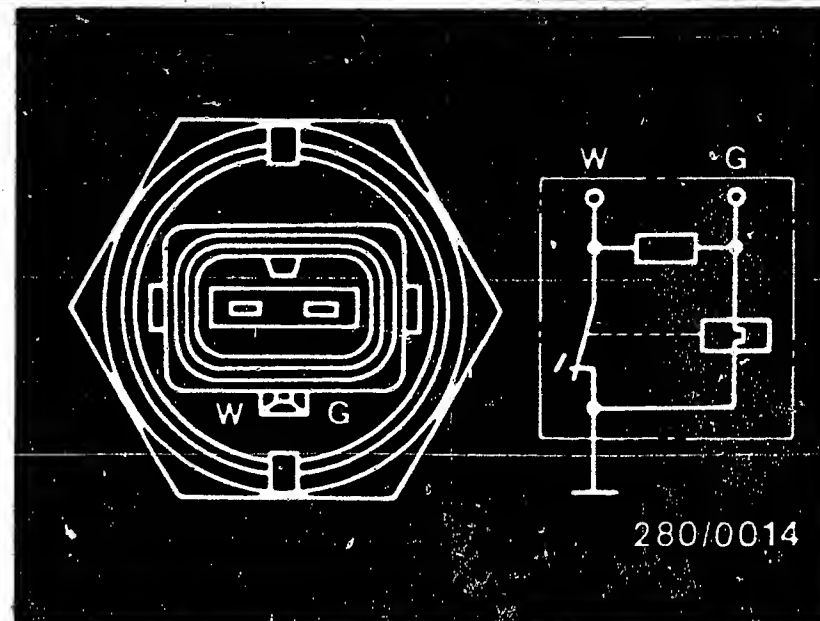
Solenoid-operated injection valve mechanically O.K.?

no

With the engine running, disconnect the injection valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K.. Using ohmmeter, test for continuity in the connecting leads from control relay term. 87 to the individual injection valves and from the injection valves to the multiple plug term. 12. Set value approx. 0 Ω. Resistance of the individual injection valves: 15.0...20 Ω. Caution! when replacing the injection valves, install only solenoid-operated injection valve 0 280 150 209.

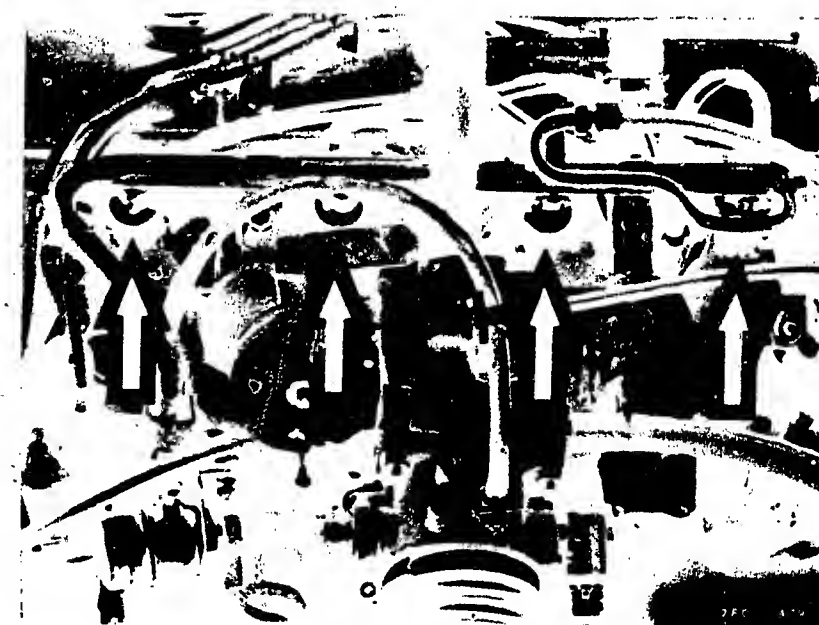
yes

Continued on E 23/E 24



280/0014

Arrows = Solenoid-operated injection valves



E21

Uneven engine idle
Volvo 360 GLT



E22

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

Injection valves checked for proper operation?

No

Connect the test lead as follows:
The two-pole plug connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motortester.

Caution!

The other terminal must not come into contact with vehicle ground. Danger of short circuit.

When the correct terminal is connected, the diagram shown opposite is visible on the oscilloscope.

Using the test lead, the injection pulses at the injection valves can be tested with an ignition oscilloscope with the engine running.

If the diagram opposite is not obtained or if there are deviations (interference, missing etc), the other injection valves should also be tested.

In case of interference →
Check routing of leads.

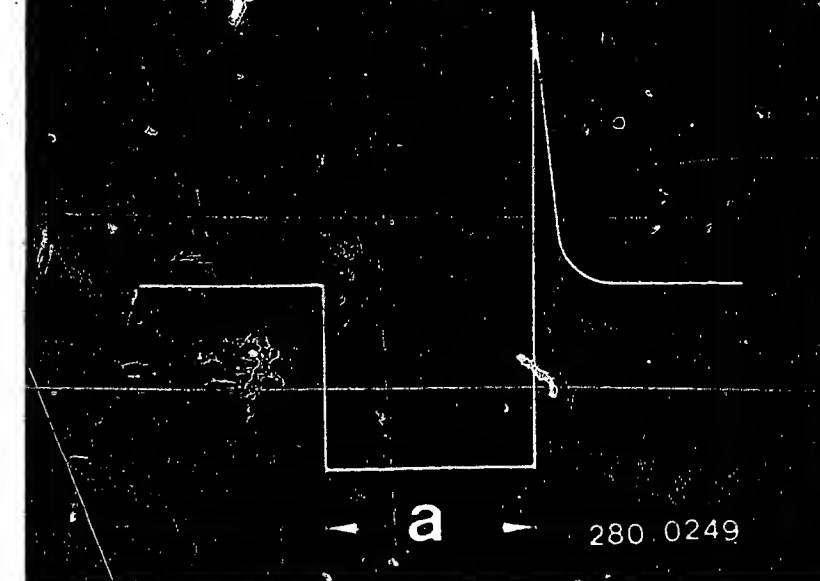
In case of missing →
Eliminate loose contacts in leads or in plug-in connections.

Yes

Continued on F 1/F 2

Injection pulse of a switched output stage
(measured at the injection valve)

a = Length of regulation
(Dependent on the engine load)



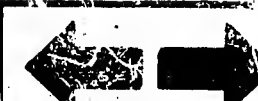
E23

Uneven engine idle
Volvo 360 GLT



E24

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment

Injection valve electrically
and mechanically O.K.?

O-ring O.K.?

No

Caution!

If a solenoid-operated injection valve is to be replaced, be sure to install solenoid-operated injection valve ..209. If injection valves are operating correctly, but O-rings are defective, proceed as follows:

1. Repair instructions only for injection valve ..209 as of FD 347 (yellow supporting plate!):

Remove fuel-distribution pipe. Pull off electric terminal. Carefully slide holding clamp out of groove and withdraw injection valve out of fuel-distribution pipe.

Caution!

Catch any escaping fuel. Do not allow to drip onto hot parts of the engine.

Caution!

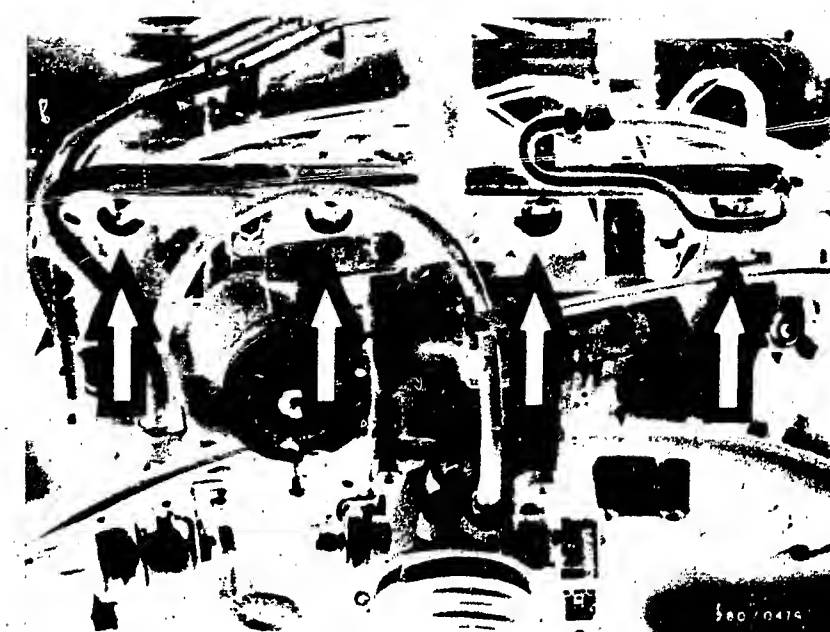
Protection sleeve must not be levered off.

Cut through the lower O-ring (intake manifold).

Caution! Do not damage protection sleeve. Fit new O-ring over protection sleeve and its bead. Do not damage any parts. Use parts set 1 287 010 704. Do not damage the valve needle when working on the injection valves. If the upper O-ring (fuel-distribution pipe connection) is swollen or damaged, it must also be replaced.

Yes

Continued on F 3/F 4.



Arrows = Solenoid operated injection valves

- 1 = FD marking
- 2 = Upper O-ring
- 3 = Part number
- 4 = Injection valve
- 5 = Supporting plate
- 6 = Lower O-ring
- 7 = Protection sleeve



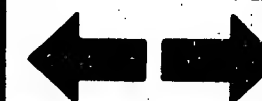
F1

Uneven engine idle
Volvo 360 GLT



F2

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

2. Repair instructions only for solenoid-operated
injection valve ..209 up to FD 346

Replace protection sleeve or O-ring. Remove fuel-distribution pipe. Pull off electric terminal. Carefully slide holding clamp out of groove and withdraw injection valve out of fuel distribution pipe.

Caution!

Catch any escaping fuel. Do not allow to drip on to hot parts of the engine. Carefully lever off protection sleeve (using screwdriver or similar).

Caution!

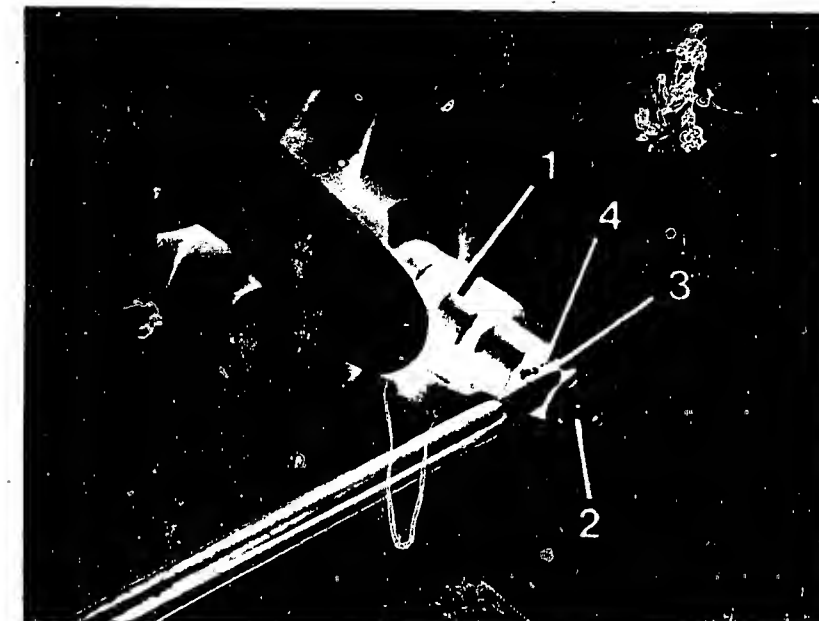
Do not damage protecting injection valve needle. Lift off lower O-ring.

Use parts set 1 287 010 704.

Fit lower O-ring and carefully press on new protection sleeve with a user-fabricated pipe-piece (approx. 120 mm long and with an inside diameter of 10 mm). Do not damage injection valve needle. If the O-ring (fuel-distribution pipe connection) is swollen, it must also be replaced.

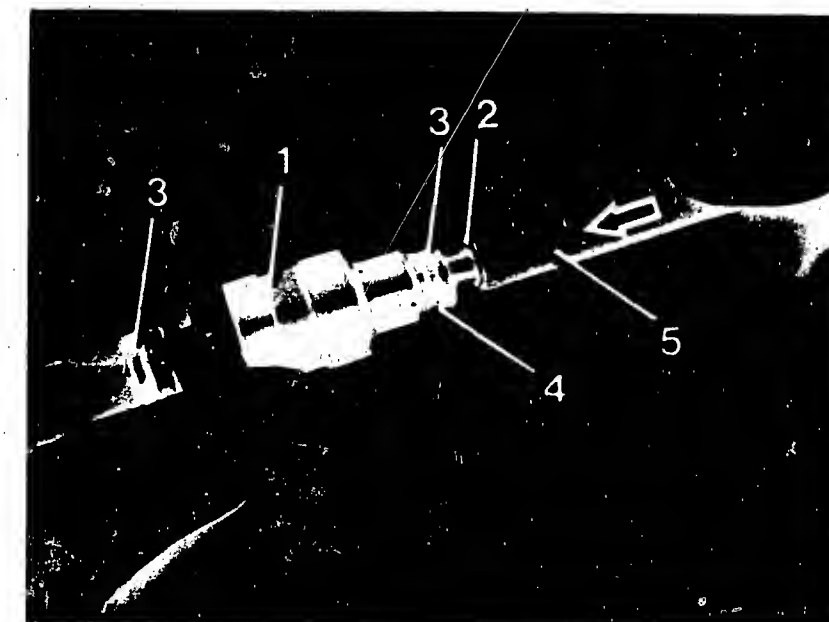
Yes

Continued on F 5/F 6



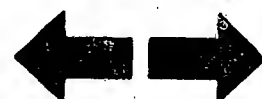
- 1 = Injection valve
- 2 = Protection sleeve
- 3 = Lower O-ring
- 4 = Supporting plate

- 1 = Injection valve
- 2 = New protection sleeve
- 3 = O-ring
- 4 = Supporting plate
- 5 = Pipe-piece



F3

Uneven engine idle
Volvo 360 GLT



F4

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

Air-flow sensor O.K.?

No

Testing:

Remove hose between air filter and air-flow sensor. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.

Test specification: $160...300\ \Omega$

Connect ohmmeter to term. 7 and term. 5 of air-flow sensor. Deflect air-flow sensor flap.

Test specification: $60...1000\ \Omega$

Air-flow sensor flap must return to rest position.

If not, the stopper or the sensor flap is bent.

Replace air-flow sensor.

Caution!

When the test is completed, the hose between air filter and air-flow sensor must be fitted again. Make sure the hose clamp is tight.

Yes

Continued on F 7/F 8

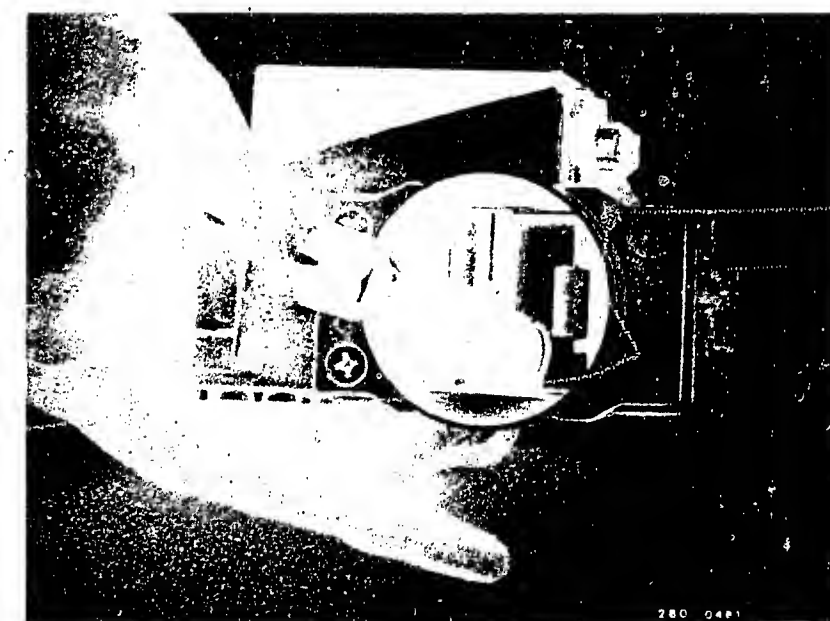


1 = Air-flow sensor

2 = Bypass screw
(CO adjustment)

Turning in clockwise direction =
richer mixture

Opening the air-flow sensor flap.



F5

Uneven engine idle
Volvo 360 GLT



F6

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

Are all hose lines and electric leads securely attached? Visual examination. Is the air-intake system leak-tight?

No

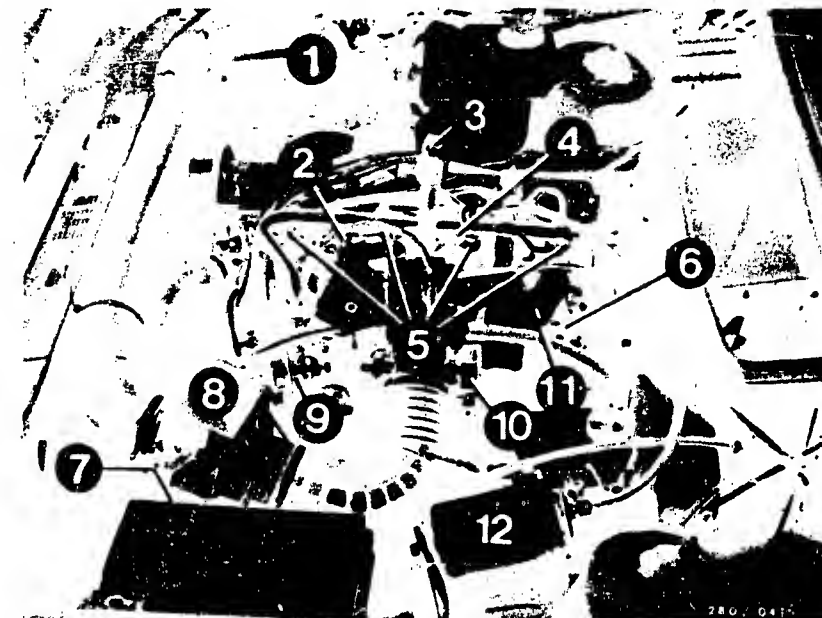
Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes

Continued on F9/F 10



- 1 = Air filter
- 2 = Ground terminal
- 3 = Auxiliary-air device
- 4 = Start valve
- 5 = Injection valves
- 6 = Thermo-time switch
- 7 = Control relay
- 8 = Air-flow sensor
- 9 = Pressure regulator
- 10 = Throttle-valve switch
- 11 = Temperature sensor II (water)
- 12 = Fuel filter

F7

Uneven engine idle
Volvo 360 GLT



F8

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

CO and idle speed correctly
adjusted?

No

CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at
normal operating temperature and at idle speed.

Idle speed

Manually-shifted transmission: $850 \dots 950 \text{ min}^{-1}$

Automatic transmission (selector lever in position
"P"): $850 \dots 950 \text{ min}^{-1}$

CO setting: $0.5 \dots 2.0\% \text{ by vol.CO}$

If CO concentration too high, turn bypass screw
(CO adjusting screw) in air-flow sensor half a
turn in a counterclockwise direction. Check engine
speed and CO concentration again. Carry out
adjustments in several steps. After adjusting,
use new plugs.

Only on Sweden version with Pulsair system
(secondary-air induction):

Idle speed: $850 \dots 950 \text{ min}^{-1}$

CO setting (engine at normal op. temp.)
with Pulsair system: $0.3 \dots 0.5\% \text{ by vol.CO}$

Pulsair system inoperative: $0.5 \dots 2.0\% \text{ by vol.CO}$

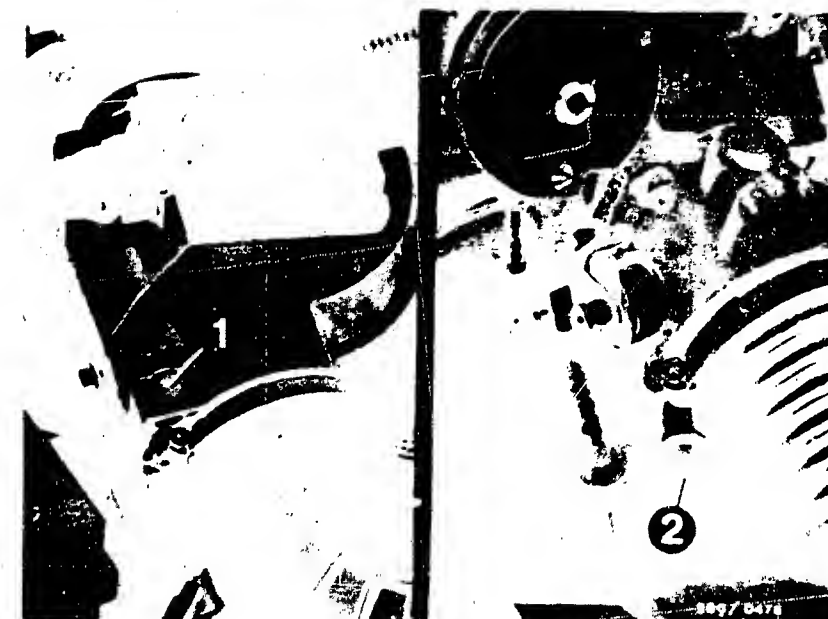
The secondary-air induction system must be rendered
inoperative for testing and adjusting the idle and
CO settings. To do this, remove hose between non-
return valve and air filter on air filter (arrow)
and seal off tight with a plug. If the vehicle is
operated in countries with less stringent exhaust-
emission legislation it is not necessary to shut
down the secondary-air induction system.

Yes

Can idle speed not be adjusted?

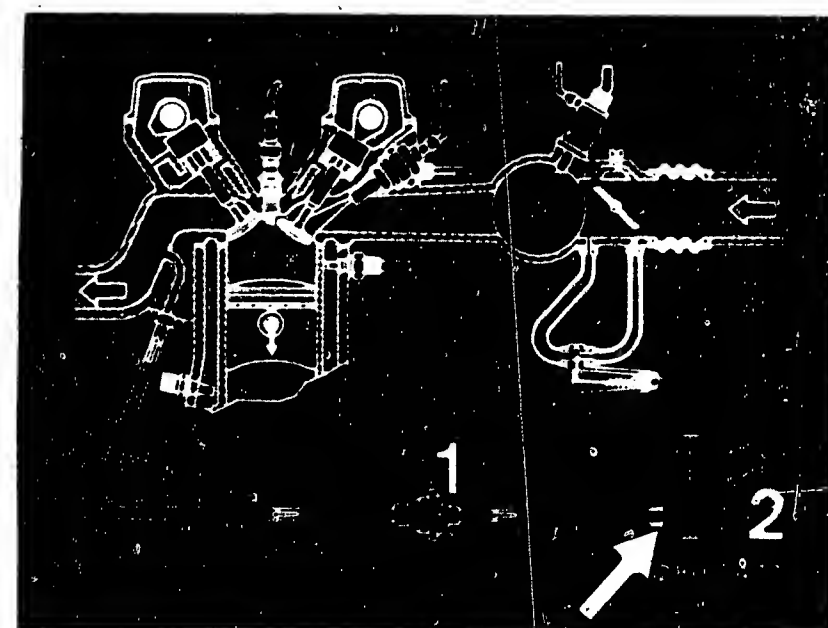
Yes

Continued on F 11/F 12



1 = CO adjusting screw
2 = Idle adjusting screw

1 = Non-return valve
2 = Air filter



F9

Uneven engine idle
Volvo 360 GLT



F10

Uneven engine idle
Volvo 360 GLT



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

Yes

Testing completed for customer complaint

"Uneven engine idle".

Customer complaint remedied?

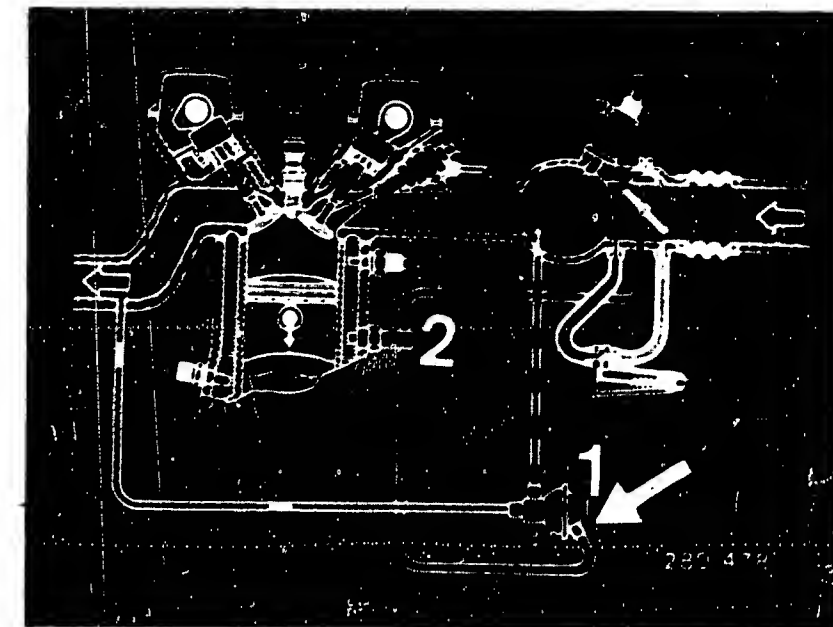
No

Only on Sweden version with exhaust-gas recirculation (EGR):

The exhaust-gas recirculation system must be rendered inoperative when testing/adjusting the idle and CO settings by removing and sealing off the vacuum-control line (arrow) on the EGR valve. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the system.

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1 = EGR valve
2 = Thermo-valve

F11

Uneven engine idle
Volvo 360 GLT



F12

Uneven engine idle
Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.

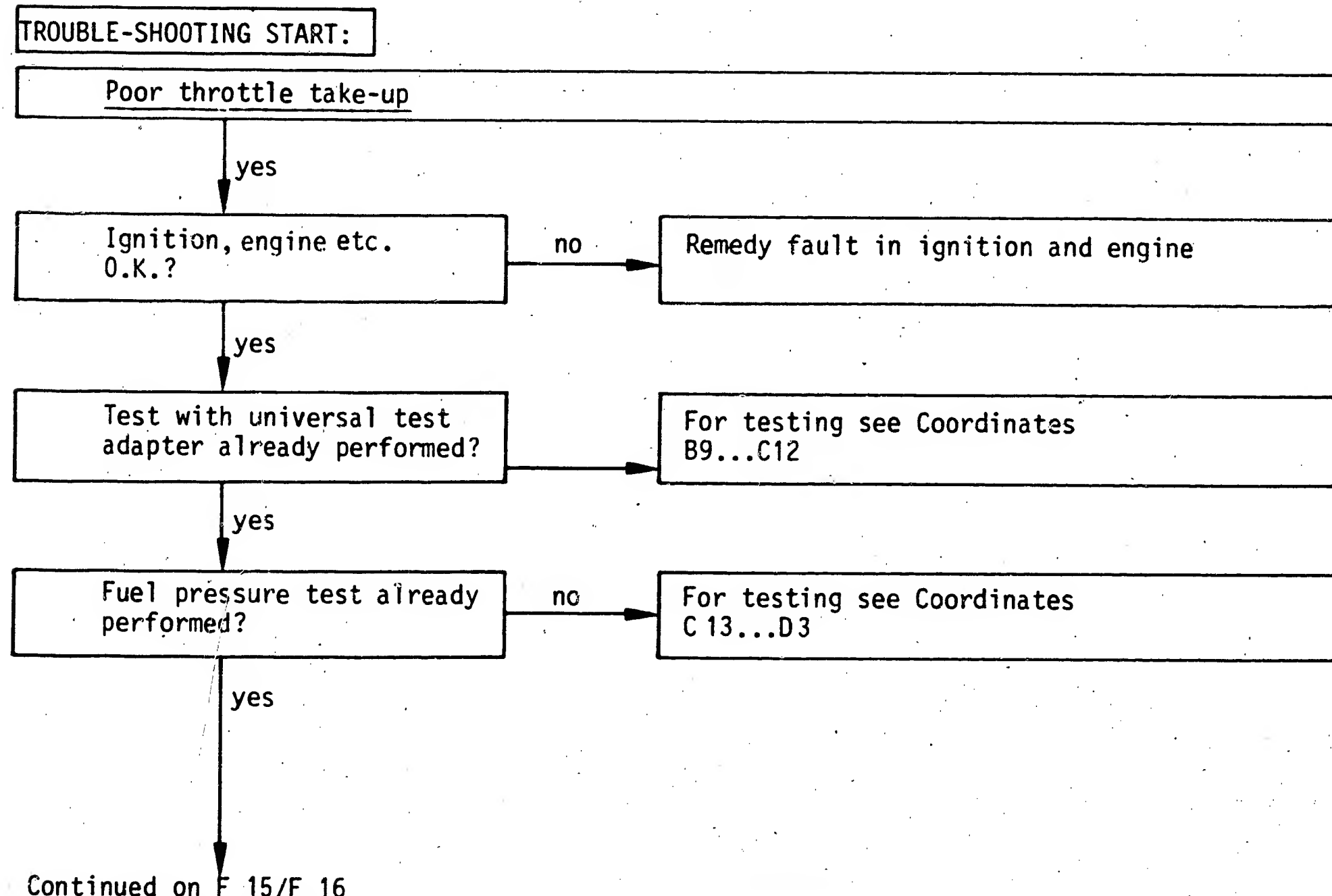
2. The middle row contains descriptions of the testing and adjustment operations on the components.

3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



F13

Poor throttle take-up
Volvo 360 GLT



F14

Poor throttle take-up
Volvo 360 GLT



Poor throttle take-up (continued)

Throttle valve closed?

No

Testing:

Throttle valve closed?

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Adjusting the throttle valve:

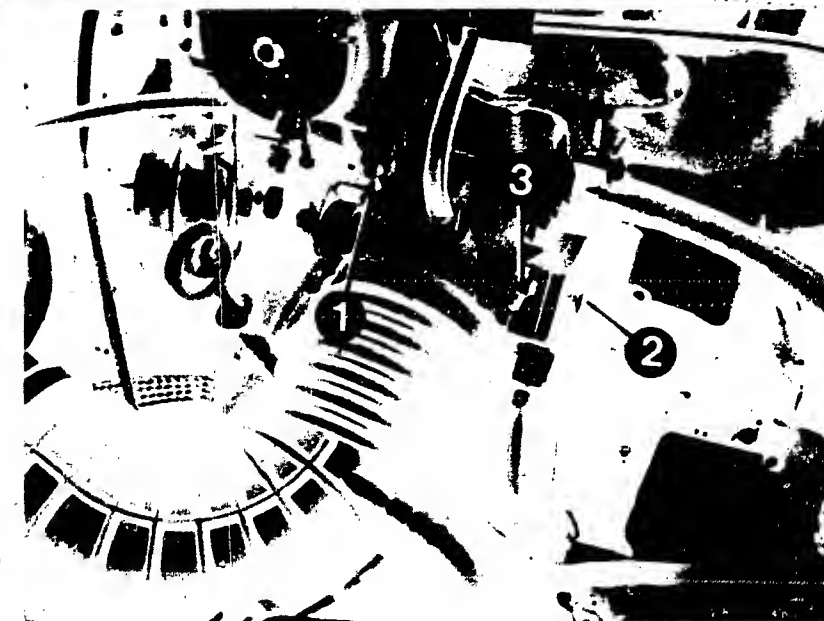
Slightly raise connecting bar so that throttle valve opens. Introduce a 0.05 mm feeler gauge on the top side between throttle valve and housing and release connecting bar. It must be possible to move the feeler gauge to and fro easily. Do the same with a 0.1 mm feeler gauge. It must not be possible to move this feeler gauge to and fro between throttle valve and housing. If necessary, adjust using adjusting screw.

Setting the throttle-valve switch:

Loosen both fastening screws. Firstly, turn throttle-valve switch in clockwise direction and then turn slowly in counterclockwise direction until a clicking noise can be heard. Secure the throttle-valve switch in this position. (The clicking noise is caused by a microswitch).

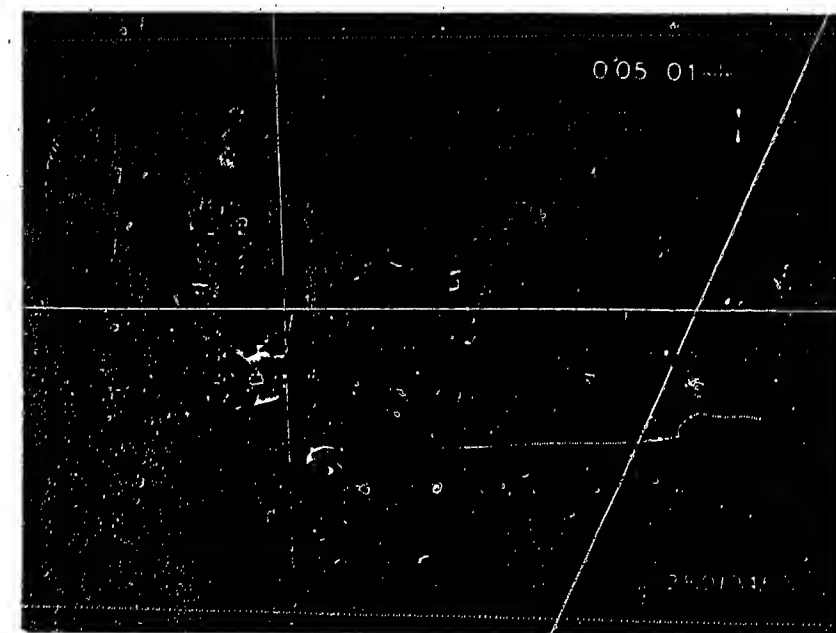
Yes

Continued on F 17/F 18



- 1 = Throttle-valve stop screw
- 2 = Throttle-valve switch
- 3 = Fastening screws

- 1 = Adjusting screw
- 2 = Connecting bar



F15

Poor throttle take-up

Volvo 360 GLT



F16

Poor throttle take-up

Volvo 360 GLT



Poor throttle take-up (continued)

Auxiliary-air device tested?
(mechanically O.K.?)

no

Testing:

1. Visual examination of auxiliary-air device:
When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device (remove hoses and look down, using a small mirror if necessary).
2. Functional test of auxiliary-air device:
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

yes

Auxiliary-air device tested?
(continued)
Electrically O.K.?

no

3. Electrical test:

Remove connector from auxiliary-air device.
Connect ohmmeter to both terminals of auxiliary-air device:

Test specification: 35...70 Ω

If the reading is outside tolerance, replace the auxiliary-air device.

yes

Continued on F 19 / F 20



Arrow = Auxiliary-air device

F17

Poor throttle take-up
Volvo 360 GLT



F18

Poor throttle take-up
Volvo 360 GLT



Poor throttle take-up (continued)

Air-flow sensor O.K.?

no

Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor. Connect ohmmeter to term. 8 and term. 9 of air-flow sensor. Test specification: $160...300\ \Omega$. Connect ohmmeter to term. 7 and term. 5 of air-flow sensor. Deflect air-flow sensor flap. Test specification: $60...1000\ \Omega$. Sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. Replace air-flow sensor.

Caution:

After testing is completed refit the hose between air filter and air-flow sensor. Tighten hose clamp securely.

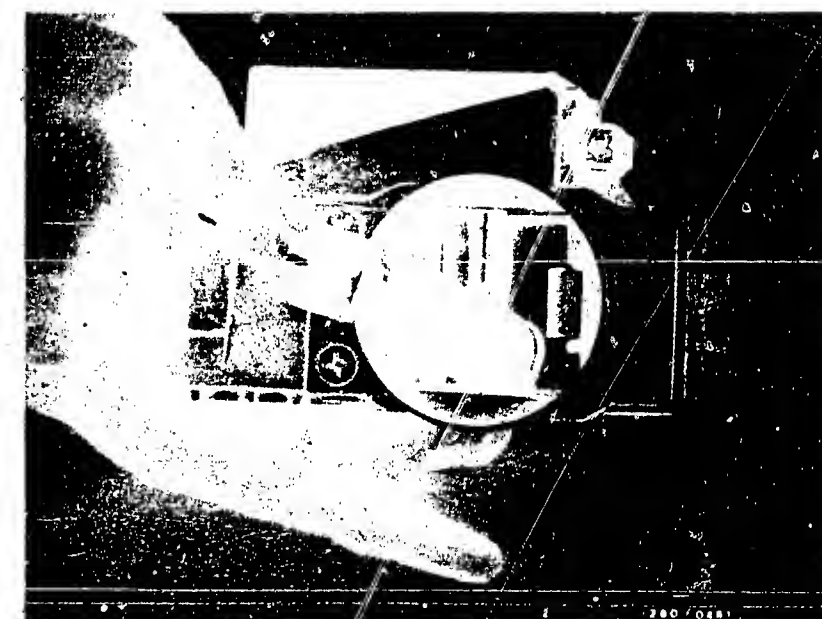
yes

Continued on F 21 / F 22



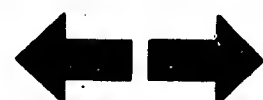
- 1 = Air-flow sensor
- 2 = Bypass screw
(CO adjustment
turning in clockwise direction
= richer mixture)

Opening the air-flow sensor flap



F19

Poor throttle take-up
Volvo 360 GLT



F20

Poor throttle take-up
Volvo 360 GLT



Poor throttle take-up (continued)

Potentiometer test (noise test):

Remove air-flow sensor. (Loosen hose clamps on either side of air-flow sensor. Loosen fastening screws of air-flow sensor. Leave plug on). Set motortester to special input and, using special cable, connect to air-flow sensor term. 7 (red clip) and term. 5 (black clip).

Making the adapter lead:

For user-fabrication: Two approx. 1 m long leads of approx. 1.5 mm².

2 test prods are fastened to one end. At the other end strip off approx. 2 cm of insulation and clamp on the clamps of the special input connecting lead.

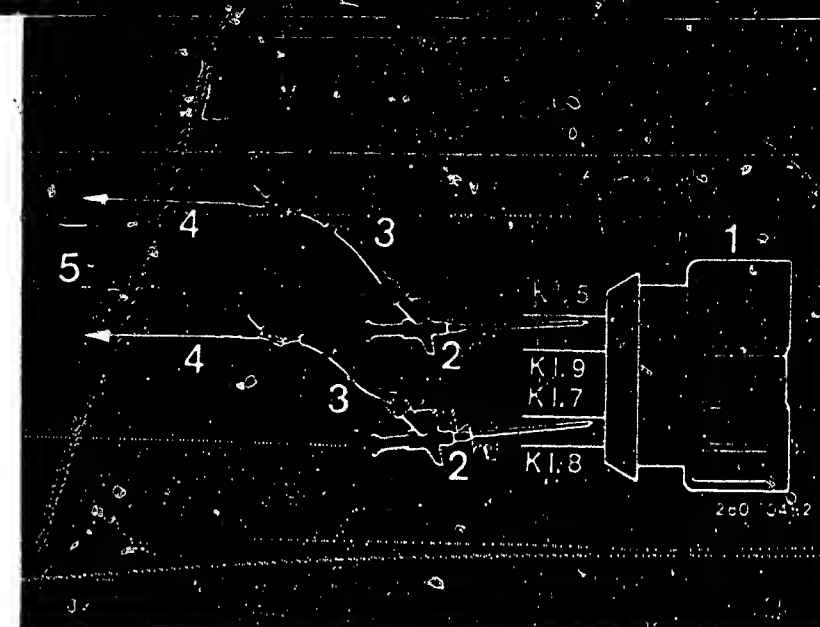
Caution!

Insulate bare joints of adapter lead. (Danger of short circuit). Carefully perform measurements on plug of air-flow sensor. Do not bend any connection springs. Set control lever for image adjustment on motortester as far as it will go to the left (calibrated setting).

Remove control relay. Plug jumper into connection base between term. 87 and term. 30. (Power supply to control unit).

Yes

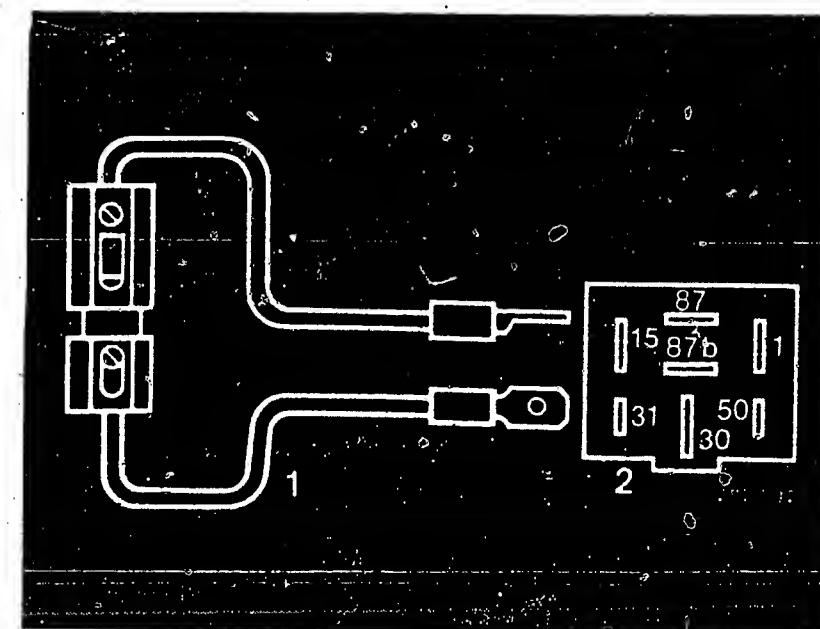
Continued on F 23/F 24



- 1 = Air-flow sensor plug
- 2 = Clamp-type test prod
- 3 = Adapter lead (user-fabricated)
- 4 = Special input connecting lead
- 5 = Motor tester special input

Jumper (user-fabricated)

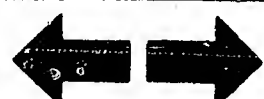
- 1 = Fuse holder with 10 A fuse
- 2 = Top view of connection base



F21

Poor throttle take-up

Volvo 360 GLT



F22

Poor throttle take-up

Volvo 360 GLT



Poor throttle take-up (continued)

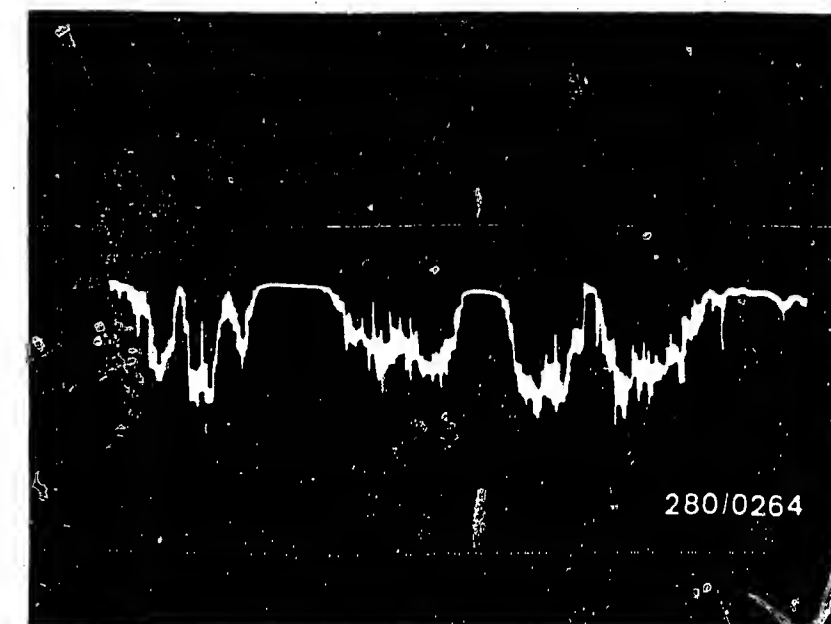
Deflect air-flow sensor flap suddenly several times. A continuous stroke signal must be visible on the oscilloscope. If incorrect (see illustration), replace air-flow sensor. After testing, correctly fit the rubber sleeve on the air-flow sensor plug. Fit all hoses and tighten (leaks).
Caution: After testing is completed, remove the jumper and reconnect the control relay.



Opening the air-flow sensor flap

Yes

Incorrect noise signal

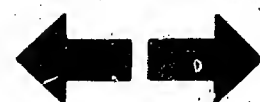


Continued on G 1/G 2

F23

Poor throttle take-up

Volvo 360 GLT



F24

Poor throttle take-up

Volvo 360 GLT



Poor throttle take-up (continued)

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

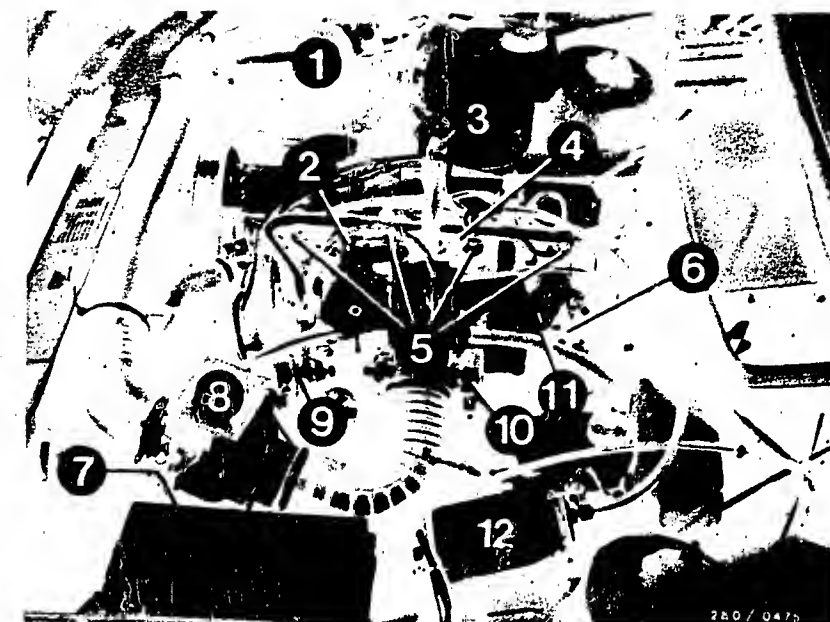
Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electric contacts for loose connection.

yes

Continued on G 3/G 4



- 1 = Air filter
- 2 = Ground terminal
- 3 = Auxiliary-air device
- 4 = Start valve
- 5 = Injection valves
- 6 = Thermo-time switch
- 7 = Control relay
- 8 = Air-flow sensor
- 9 = Pressure regulator
- 10 = Throttle valve switch
- 11 = Temperature sensor II (water)
- 12 = Fuel filter

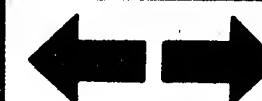
G1

Poor throttle take-up
Volvo 360 GLT



G2

Poor throttle take-up
Volvo 360 GLT



Poor throttle take-up (continued)

CO and idle speed correctly adjusted?

No

CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed.

Idle speed

Manually-shifted transmission: $850 \dots 950 \text{ min}^{-1}$

Automatic transmission (selector lever in position "P"): $850 \dots 950 \text{ min}^{-1}$

CO setting: $0.5 \dots 2.0\% \text{ vol. CO}$

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction. Check engine speed and CO concentration again. Carry out adjustments in several steps. After adjusting, use new plugs.

Only on Sweden version with Pulsair system (secondary-air induction):

Idle speed: $850 \dots 950 \text{ min}^{-1}$

CO setting (engine at normal op. temp.) with Pulsair system: $0.3 \dots 0.5\% \text{ by vol. CO}$

Pulsair system inoperative: $0.5 \dots 2.0\% \text{ by vol. CO}$

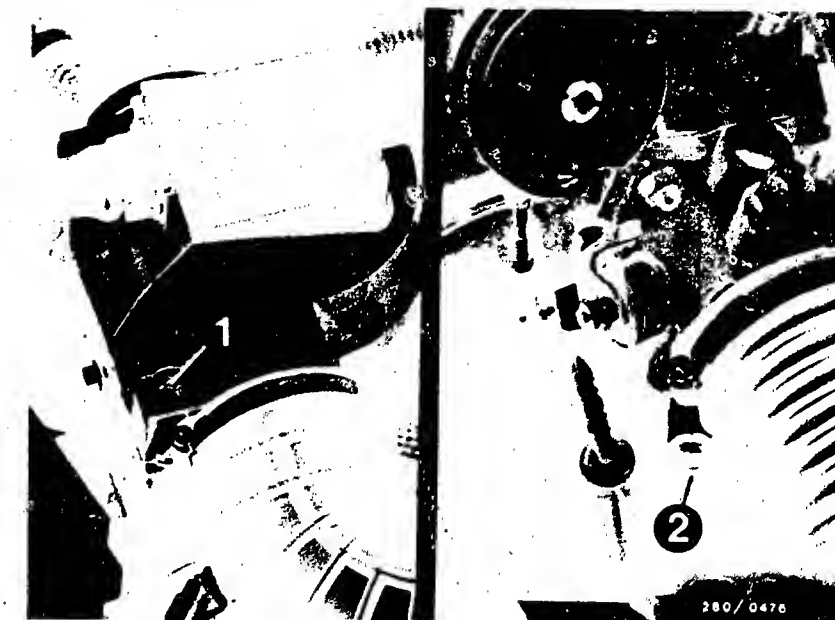
The secondary-air induction system must be rendered inoperative for testing and adjusting the idle and CO settings. To do this, remove hose between non-return valve and air filter on air filter (arrow) and seal off tight with a plug. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the secondary-air induction system.

Yes

Can idle speed not be adjusted?

Yes

Continued on G 5/G 6

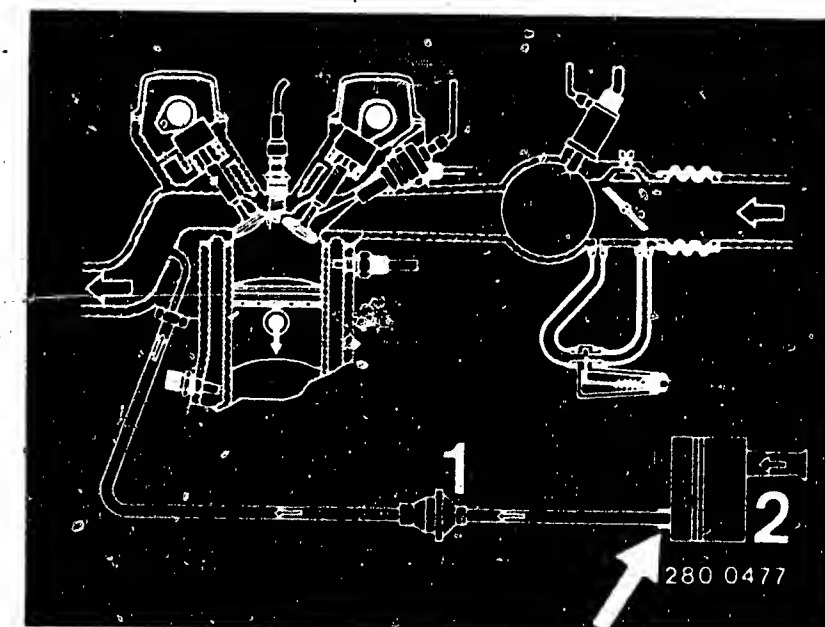


1 = CO adjusting screw

2 = Idle adjusting screw

1 = Non-return valve

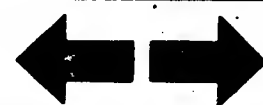
2 = Air filter



G3

Poor throttle take-up

Volvo 360 GLT



G4

Poor throttle take-up

Volvo 360 GLT



Poor throttle take-up (continued)

Yes

Testing completed for
customer complaint

"Poor throttle take-up".

Customer complaint remedied?

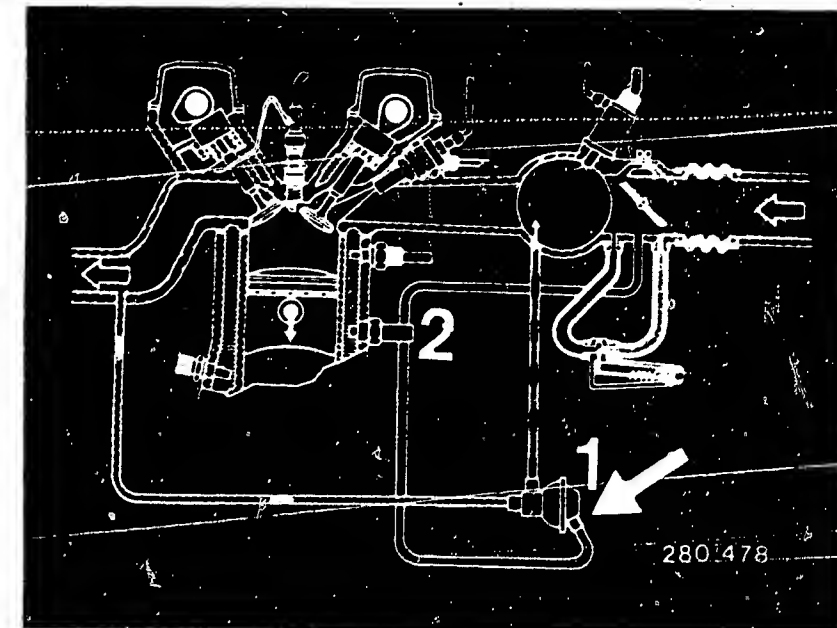
No

Only on Sweden version with exhaust-gas recirculation (EGR):

The exhaust-gas recirculation system must be rendered inoperative when testing/adjusting the idle and CO settings by removing and sealing off the vacuum-control line (arrow) on the EGR valve. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the system.

Further possibilities:

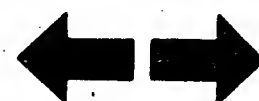
- Customer complaint incorrectly diagnosed (see Coordinates B3...B8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1 = EGR valve
2 = Thermo-valve

G5

Poor throttle take-up
Volvo 360 GLT



G6

Poor throttle take-up
Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.

2. The middle row contains descriptions of the testing and adjustment operations on the components.

3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

TROUBLE-SHOOTING START:

Engine missing under all operating conditions

yes

Ignition engine etc.
O.K.?

no

Remedy fault in ignition and
engine.

yes

Test with universal test
adapter already performed?

no

For testing see Coordinates
B 9...C12

yes

Fuel pressure test already
performed?

no

For testing see Coordinates
C 13 ... D 3

yes

Continued on G 9/G 10

G7

Engine missing under all op. conditions
Volvo 360 GLT



G8

Engine missing under all op. conditions
Volvo 360 GLT



Engine missing under all operating conditions (continued)

Plug-in connection of Jetronic wiring harness O.K.?
Loose contacts?

no

Check all plug-in connections for security and corrosion. Ensure a good ground connection. (Terminals 5, 13, 26, 38 and 56)

yes

Power supply to injection system O.K.?
Loose contacts?
Control relay O.K.?

no

Remove wiring-harness plugs from the control relay. Check whether all blade receptacles and leads are O.K.
Plug on control relay and turn round so that the connection base is accessible from below.
Test power supply.
Switch on ignition. Using voltmeter, measure battery voltage at term. 30 to vehicle ground.
Start engine. Using voltmeter, measure voltage to vehicle ground at term. 15 and term. 50, also term. 87 and 87b (set value 7...15 V). To test the voltage at term. 1 it is necessary to remove the control relay. (Set value 7...15 V to vehicle ground). If no voltage, test connecting leads and, if necessary, replace the control relay.
Test all connecting leads for continuity. Move the wiring harness when doing this. Suspicion of line breaks.

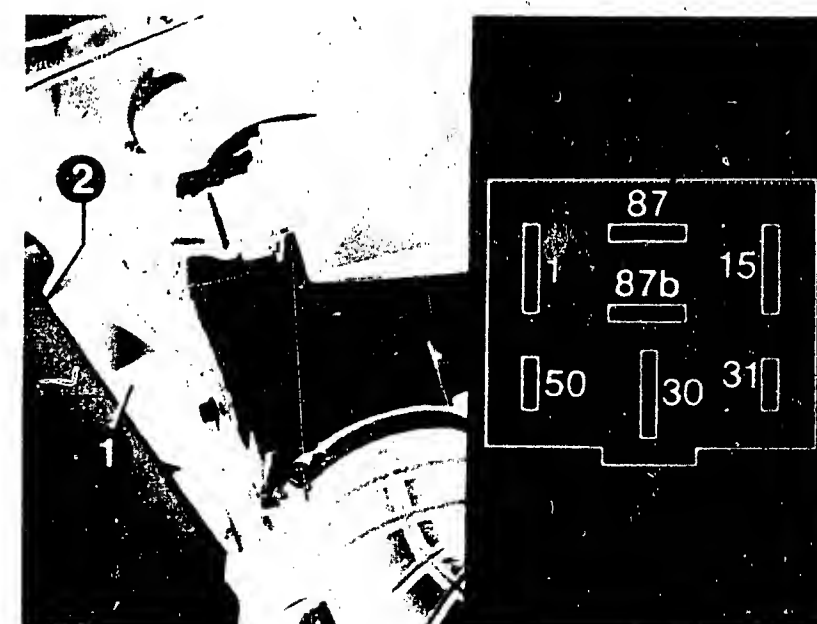
yes

Continued on G 11/G 12



Arrow = Central ground terminal

1 = Control relay
Connection base (view from below)



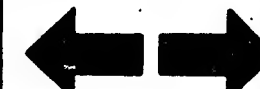
G9

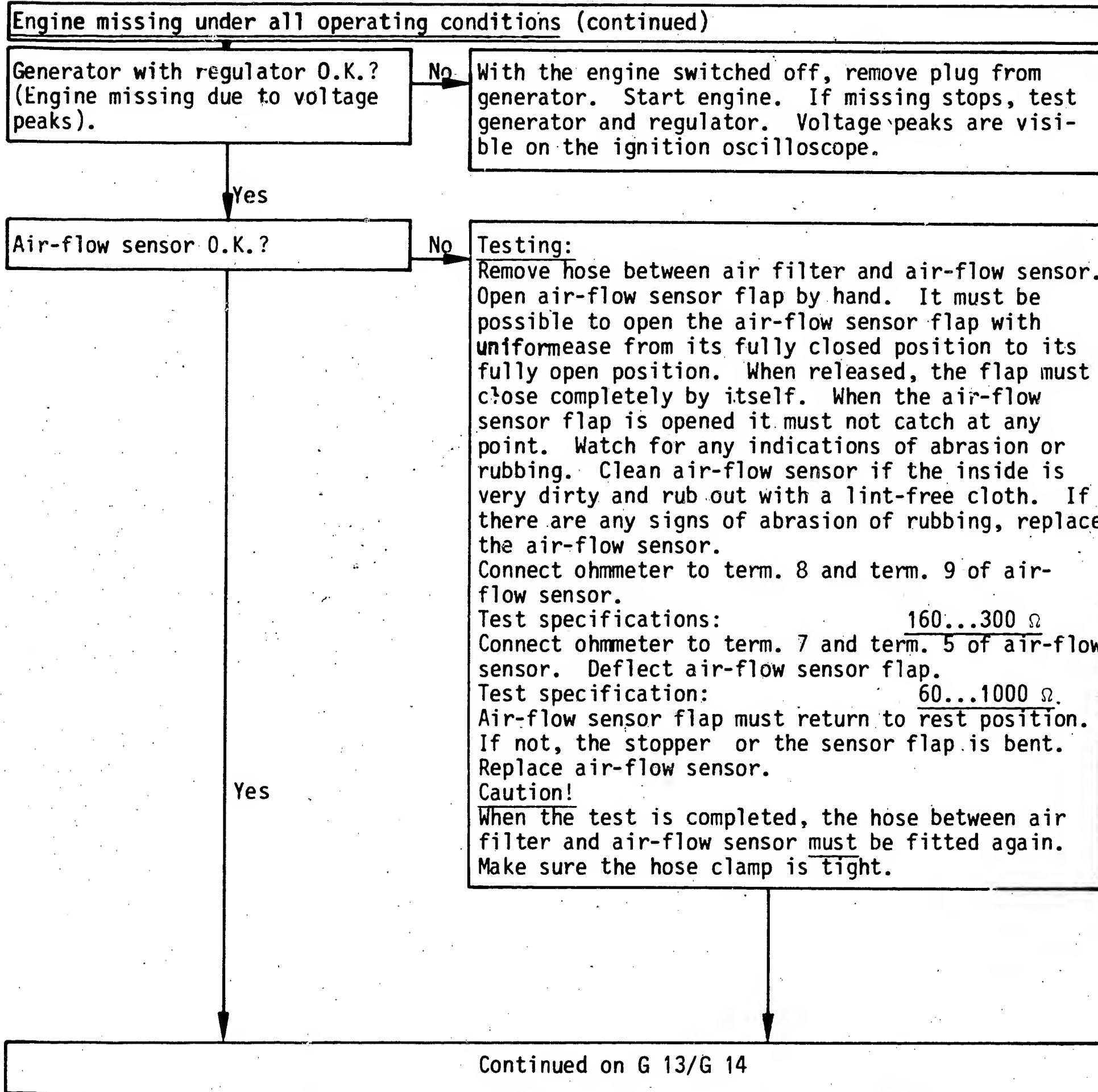
Engine missing under all op. conditions
Volvo 360 GLT



G10

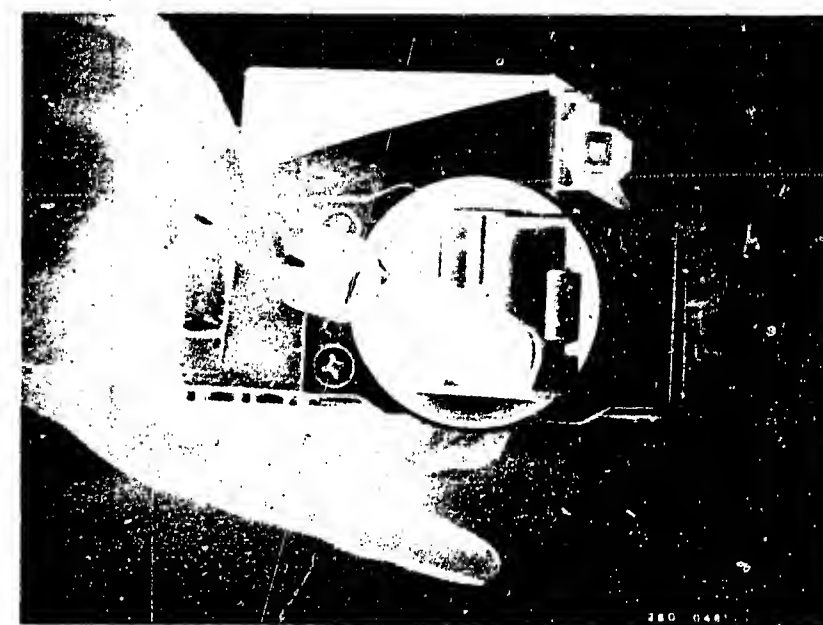
Engine missing under all op. conditions
Volvo 360 GLT





- 1 = Air-flow sensor
 2 = Bypass screw (CO adjustment)
 Turning in clockwise direction = richer mixture

Opening the air-flow sensor flap.



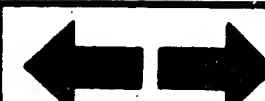
G11

Engine missing
 Volvo 360 GLT



G12

Engine missing
 Volvo 360 GLT



Engine missing under all operating conditions (continued)

Potentiometer test (noise test):

Remove air-flow sensor. (Loosen hose clamps on either side of air-flow sensor. Loosen fastening screws of air-flow sensor. Leave plug on). Set motortester to special input and, using special cable, connect to air-flow sensor term. 7 (red clip) and term. 5 (black clip).

Making the adapter lead:

For user-fabrication: Two approx. 1 m long leads of approx. 1.5 mm².

2 test prods are fastened to one end. At the other end strip off approx. 2 cm of insulation and clamp on the clamps of the special input connecting lead.

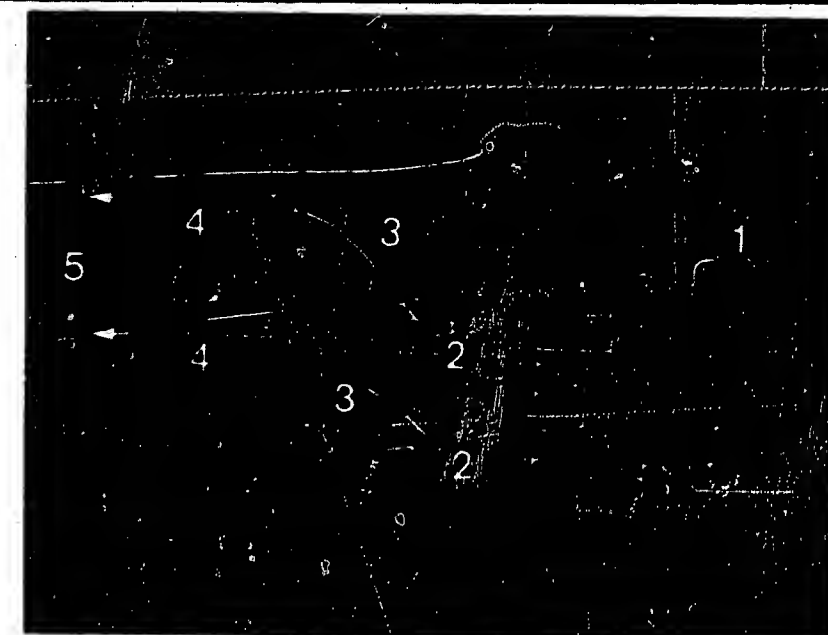
Caution!

Insulate bare joints of adapter lead. (Danger of short circuit). Carefully perform measurements on plug of air-flow sensor. Do not bend any connection springs. Set control lever for image adjustment on motortester as far as it will go to the left (calibrated setting).

Remove control relay. Plug jumper into connection base between term. 87 and term. 30. (Power supply to control unit).

Yes

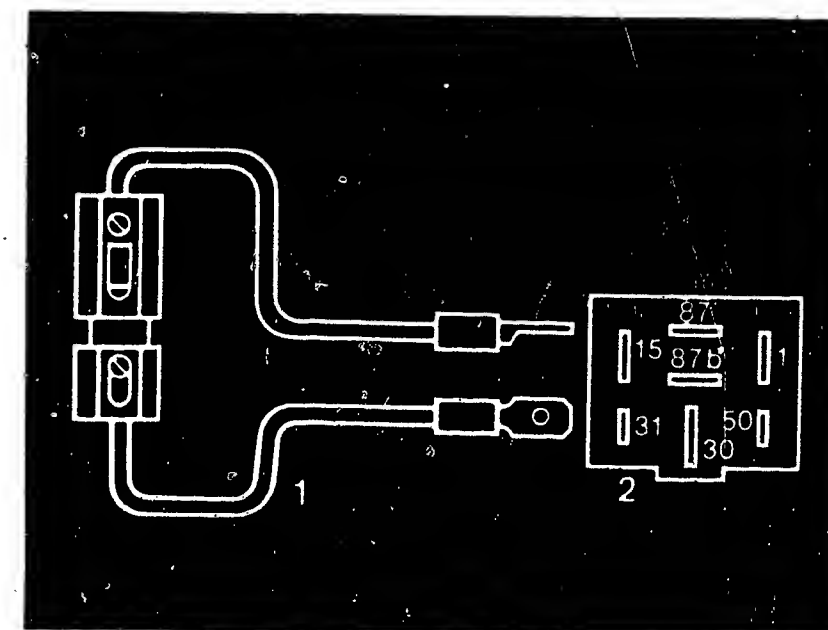
Continued on G 15/G 16



- 1 = Air-flow sensor plug
- 2 = Clamp-type test prod
- 3 = Adapter 1 (user-fabricated)
- 4 = Special input connecting lead
- 5 = Motor tester special input

Jumper (user-fabricated)

- 1 = Fuse holder with 10 A fuse
- 2 = Top view of connection base



G 13

Engine missing
Volvo 360 GLT



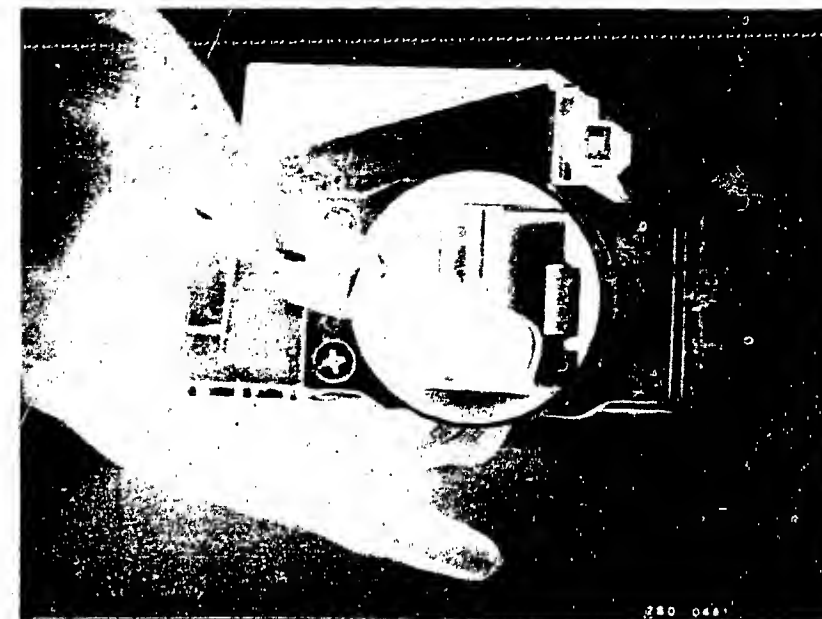
G 14

Engine missing
Volvo 360 GLT



Engine missing under all operating conditions (continued)

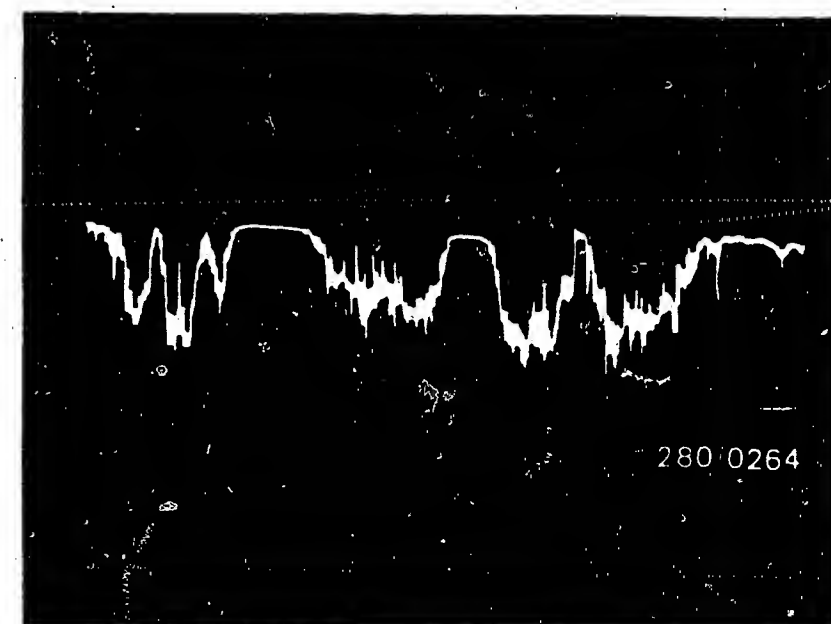
Deflect air-flow sensor flap suddenly several times. A continuous stroke signal must be visible on the oscilloscope. If incorrect (see illustration), replace air-flow sensor. After testing, correctly fit the rubber sleeve on the air-flow sensor plug. Fit all hoses and tighten (leaks). Caution: After testing is completed, remove the jumper and reconnect the control relay.



Opening the air-flow sensor flap

Yes

Incorrect noise signal



Continued on G 17/G 18

G 15

Engine missing
Volvo 360 GLT



G 16

Engine missing
Volvo 360 GLT



Engine missing under all operating conditions (continued)

Fuel delivery O.K.?

No

Measuring the fuel delivery:

For testing, undo the junction between the fuel return hose (from pressure regulator) and fuel return line (to fuel tank). If necessary, extend hose and lead into a 5 l vessel with graduated scale.

Remove control relay and plug jumper into connection base between term. 87b and term. 30.

Fuel pump must operate.

Caution! Be sure to remove jumper after testing is completed.

Test specification: min. 700 cm³/30 sec

Remedy if test specification not reached:

- Fuel filter clogged → replace.
- Voltage at fuel pump plugs, with engine running min. 12 V → clean contacts, possibly also eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace.
- Fuel pump delivery too low → replace fuel pump.

Yes

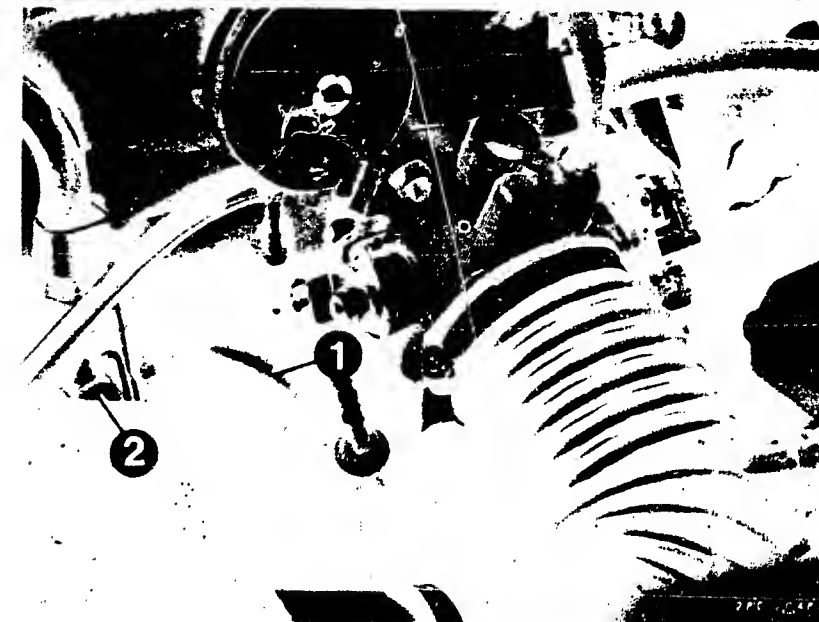
Control unit O.K.?

No

Let engine run. Shake control unit lightly and move multiple plug. Watch for engine missing. Repair plug-in connection on multiple plug or replace defective control unit.

Yes

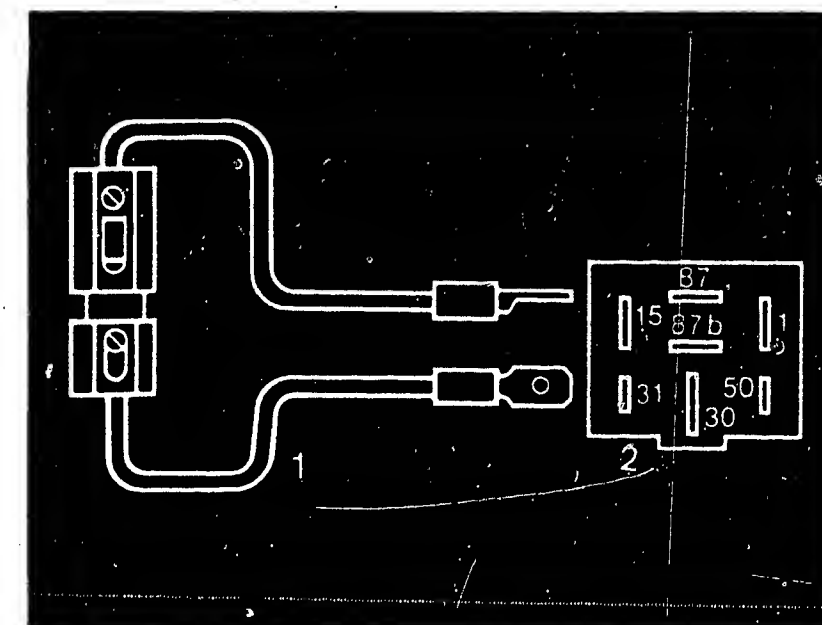
Continued on G 19/G 20



1 = Fuel return line
2 = Pressure regulator

Jumper (user-fabricated)

1 = Fuse holder with 10 A fuse
2 = Top view of connection base



G17

Engine missing
Volvo 360 GLT



G18

Engine missing
Volvo 360 GLT



Engine missing under all operating conditions (continued)

Burbling on the overrun?
Throttle valve closed? CO
and idle adjustment O.K.?

No

1. Check the exhaust system for leaks.
2. Throttle valve closed?
Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Adjusting the throttle valve:

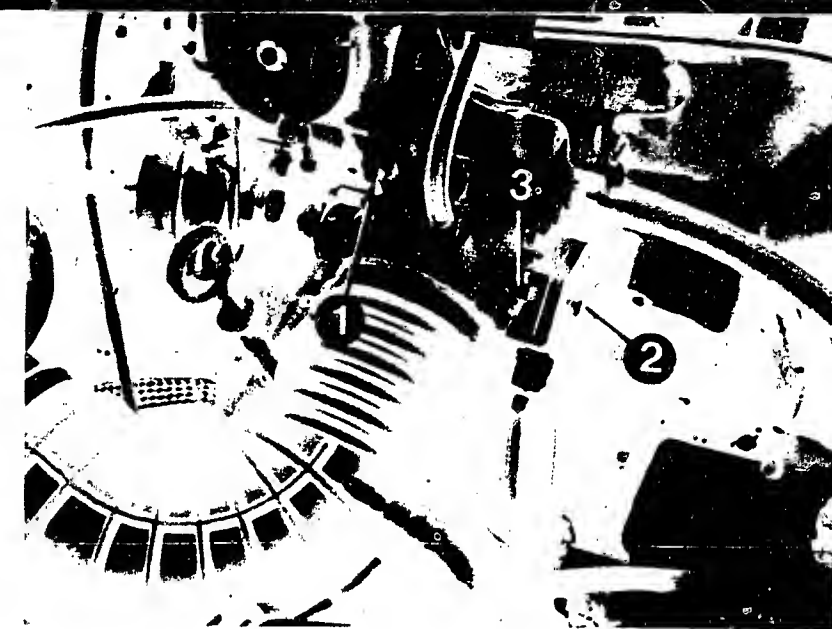
Slightly raise connecting bar so that throttle valve opens. Introduce a 0.05 mm feeler gauge on the top side between throttle valve and housing and release connecting bar. It must be possible to move the feeler gauge to and fro easily. Do the same with a 0.1 mm feeler gauge. It must not be possible to move this feeler gauge to and fro between throttle valve and housing. If necessary, adjust using adjusting screw.

Setting the throttle-valve switch:

Loosen both fastening screws. Firstly, turn throttle-valve switch in clockwise direction and then turn slowly in counterclockwise direction until a clicking noise can be heard. Secure the throttle-valve switch in this position. (The clicking noise is caused by a microswitch).

Yes

Continued on G 21/G 22



- 1 = Throttle-valve stop screw
- 2 = Throttle-valve switch
- 3 = Fastening screws

- 1 = Adjusting screw
- 2 = Connecting bar



G 19

Engine missing
Volvo 360 GLT



G 20

Engine missing
Volvo 360 GLT



Engine missing under all operating conditions (continued)

3. Testing the overrun cutoff:

Bring the engine to 3000 min⁻¹ and, using insulated wire, bridge term. 2 and lead 9 (term. 18) in the plug of the throttle-valve switch.

Far below ambient temperature (below + 15° C):

Up to approx. 2000 min⁻¹ there must be no injection pulses. Below 2000 min⁻¹ the injection pulses must be present again. The reinstatement speed is approx. 400 min⁻¹ higher.

Warm engine temperature (approx. 80°C):

Up to approx. 1300 min⁻¹ there must be no injection pulses. Below 1300 min⁻¹ the injection pulses must be present again. The reinstatement speed is approx. 400 min⁻¹ higher.

CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed.

Idle speed

Manually-shifted transmission:

850...950 min⁻¹

Automatic transmission (Selector lever in position "P"):

850...950 min⁻¹

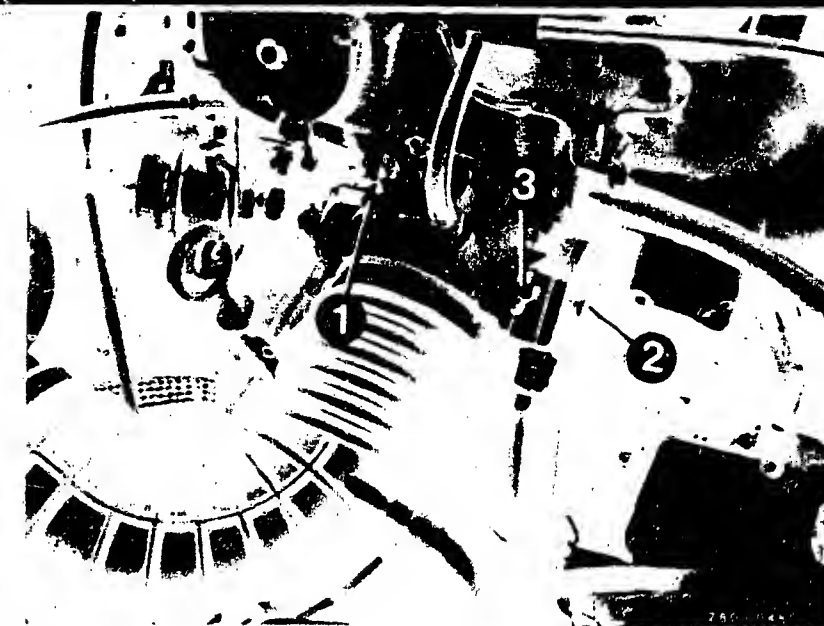
CO setting:

0.5...2.0% by vol. CO

If CO concentration too high, adjust bypass screw (CO adjusting screw) in air-flow sensor by half a turn in a counterclockwise direction. Check engine speed and CO concentration again. Make adjustments in several steps. After adjusting, use new plugs.

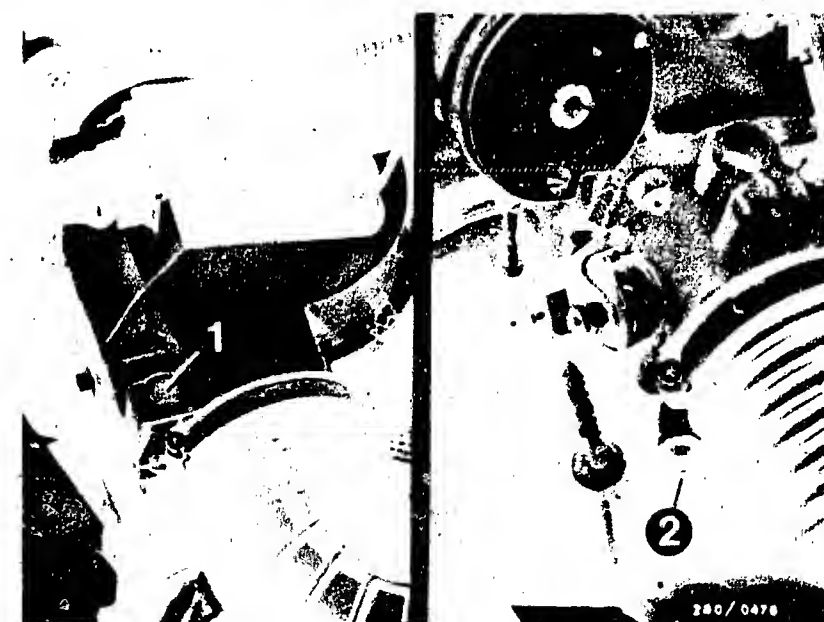
yes

Continued on G 23/G 24



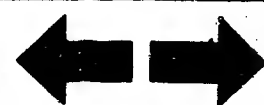
- 1 = Throttle-valve stop screw
- 2 = Throttle-valve switch
- 3 = Fastening screws

- 1 = CO adjusting screw
- 2 = Idle adjusting screw



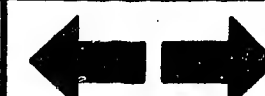
G21

Engine missing
Volvo 360 GLT



G22

Engine missing
Volvo 360 GLT



Engine missing under all operating conditions (continued)

Only on Sweden version with Pulsair system
(secondary-air induction):

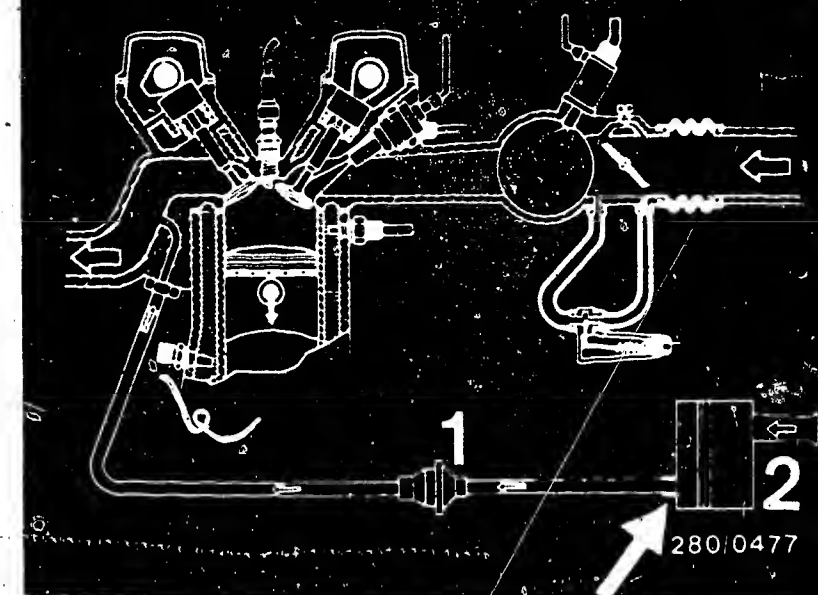
Idle speed: 850...950 min⁻¹
 CO setting (engine at normal op. temp.)
 with Pulsair system: 0.3...0.5% by vol. CO
 Pulsair system inoperative: 0.5...2.0% by vol. CO

The secondary-air induction system must be rendered inoperative for testing and adjusting the idle and CO settings. To do this, remove hose between non-return valve and air filter on air filter (arrow) and seal off tight with a plug. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the secondary-air induction system.

Only on Sweden version with exhaust-gas recirculation (EGR):

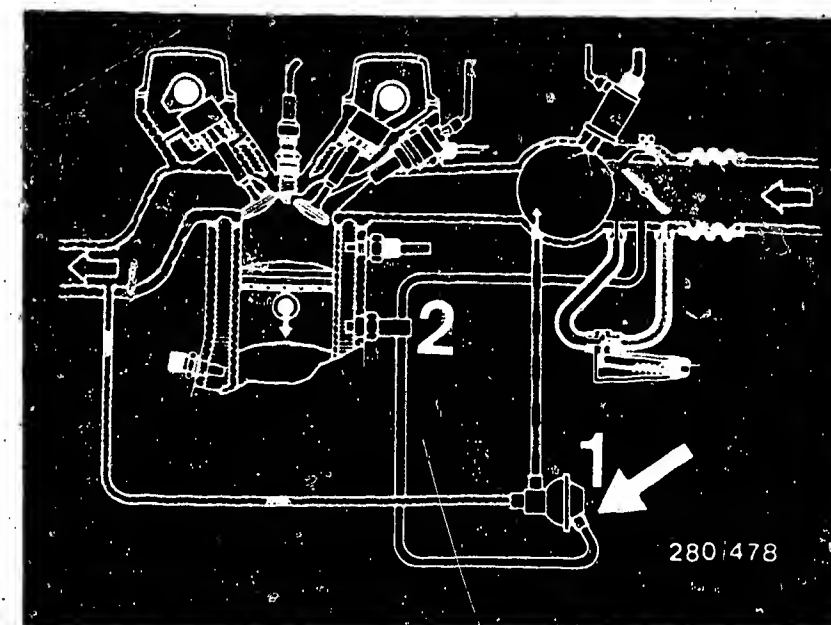
The exhaust-gas recirculation system must be rendered inoperative when testing/adjusting the idle and CO settings by removing and sealing off the vacuum-control line (arrow) on the EGR valve. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the system.

Yes



1 = Non-return valve
 2 = Air filter

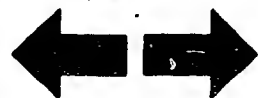
1 = EGR valve
 2 = Thermo-valve



Continued on H 1/H 2

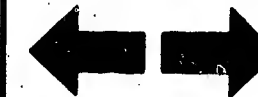
G23

Engine missing
 Volvo 360 GLT



G24

Engine missing
 Volvo 360 GLT



Engine missing under all operating conditions (continued)

Injection valves checked for proper operation?

No

Connect the test lead as follows:
The two-pole plug connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motortester.

When the correct terminal is connected, the diagram shown opposite is visible on the oscilloscope.

Using the test lead, the injection pulses at the injection valves can be tested with an ignition oscilloscope with the engine running.

If the diagram opposite is not obtained or if there are deviations (interference, missing etc), the other injection valves should also be tested.

In case of interference →
Check routing of leads.

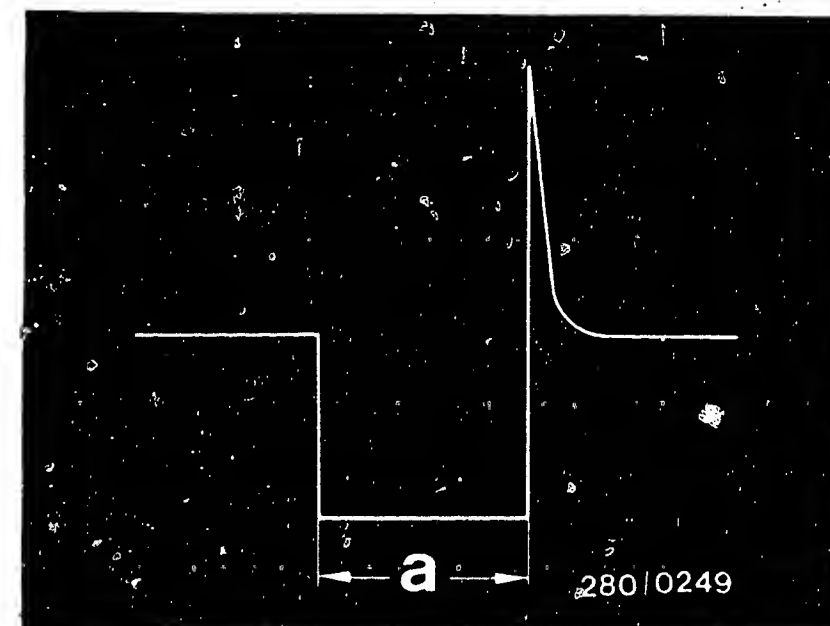
In case of missing →

Eliminate loose contacts in leads or in plug-in connections.

With the engine running, detach injection-valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve O.K. Using ohmmeter, test for continuity in connecting leads from control relay term. 87 to the individual injection valves and after the injection valves to multiple plug term. 12. Set value approx. 0Ω .
Resistance of individual injection valves
 $15...20\Omega$.

Yes

Continued on H 3/H 4

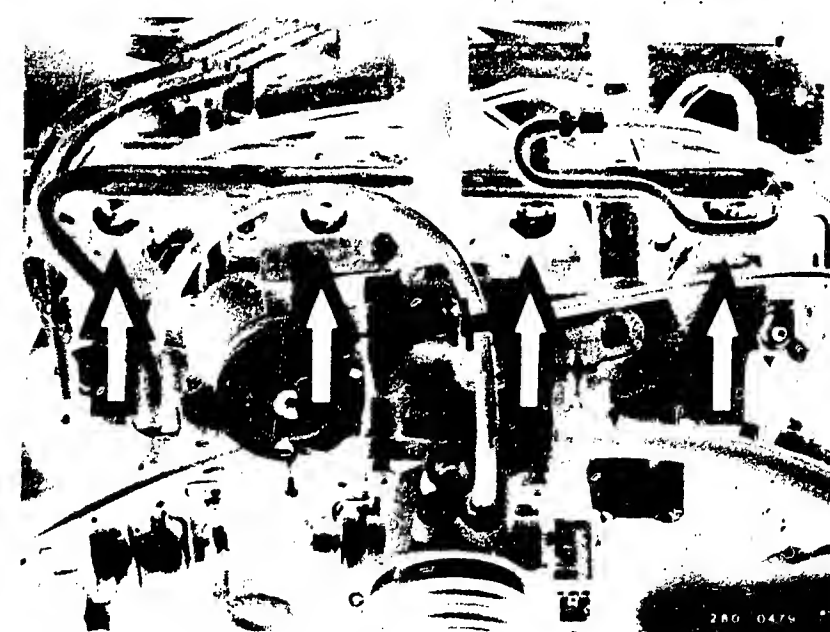


Injection pulse of a switched output stage

(Measured on the injection valve)

a = Length of regulation
(Dependent on the engine load)

Arrows - solenoid-operated injection valves



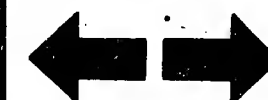
H1

Engine missing
Volvo 360 GLT



H2

Engine missing
Volvo 360 GLT



Engine missing under all operating conditions (continued)

Injection valve electrically
and mechanically O.K.?

O-ring O.K.?

No

Caution!

If a solenoid-operated injection valve is to be replaced, be sure to install solenoid-operated injection valve ..209. If injection valves are operating correctly, but O-rings are defective proceed as follows:

1. Repair instructions only for injection valve ..209 as of FD 347 (yellow supporting plate!):
Remove fuel-distribution pipe. Pull off electric terminal. Carefully slide holding clamp out of groove and withdraw injection valve out of fuel-distribution pipe.

Caution!

Catch any escaping fuel. Do not allow to drip onto hot parts of the engine.

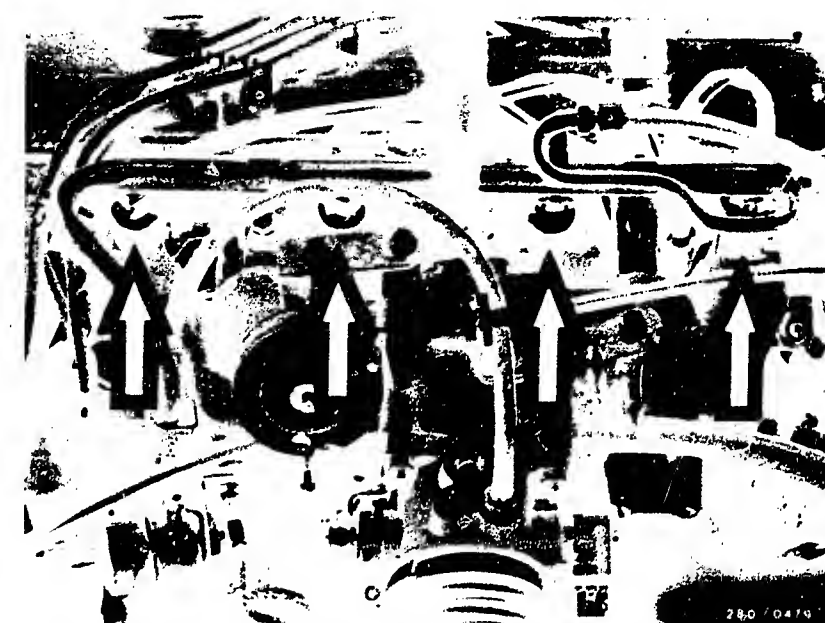
Caution!

Protection sleeve must not be levered off.

Cut through the lower O-ring (intake manifold).
Caution! Do not damage protection sleeve. Fit new O-ring over protection sleeve and its bead. Do not damage any parts. Use parts set 1 287 010 704. Do not damage the valve needle when working on the injection valves. If the upper O-ring (fuel-distribution pipe connection) is swollen or damaged, it must also be replaced.

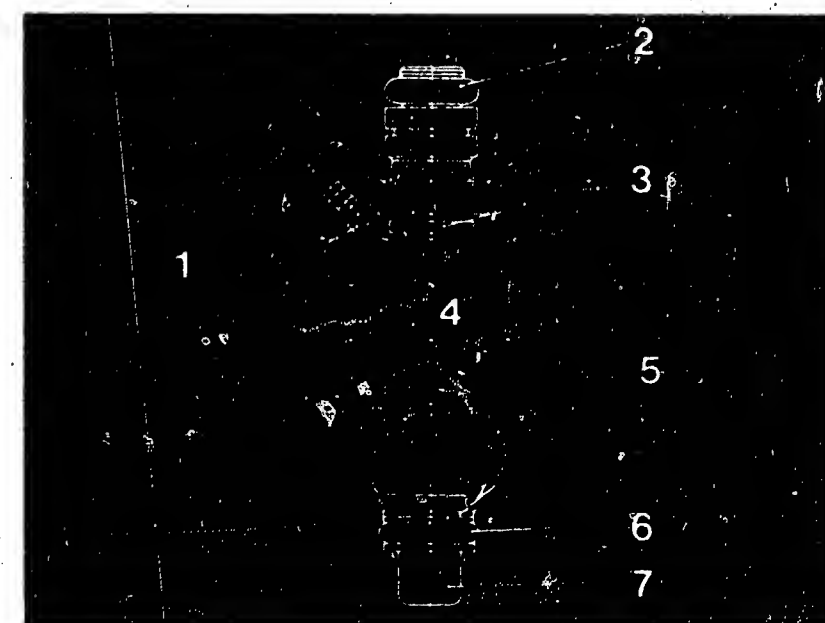
Yes

Continued on H 5/H 6



Arrows = Solenoid operated injection valves

- 1 = FD marking
- 2 = Upper O-ring
- 3 = Part number
- 4 = Injection valve
- 5 = Supporting plate
- 6 = Lower O-ring
- 7 = Protection sleeve



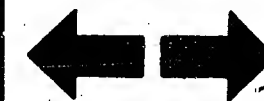
H3

Engine missing
Volvo 360 GLT



H4

Engine missing
Volvo 360 GLT



Engine missing under all operating conditions (continued)

Yes

2. Repair instructions only for solenoid-operated injection valve ..209 up to FD 346

Replace protection sleeve or O-ring. Remove fuel-distribution pipe. Pull off electric terminal. Carefully slide holding clamp out of groove and withdraw injection valve out of fuel distribution pipe.

Caution!

Catch any escaping fuel. Do not allow to drip on to hot parts of the engine. Carefully lever off protection sleeve (using screw-driver or similar).

Caution!

Do not damage protecting injection valve needle. Lift off lower O-ring. Use parts set 1 287 010 704. Fit lower O-ring and carefully press on new protection sleeve with a user-fabricated pipe-piece (approx. 120 mm long and with an inside diameter of 10 mm). Do not damage injection valve needle. If the O-ring (fuel-distribution pipe connection) is swollen, it must also be replaced.

Testing completed for customer complaint

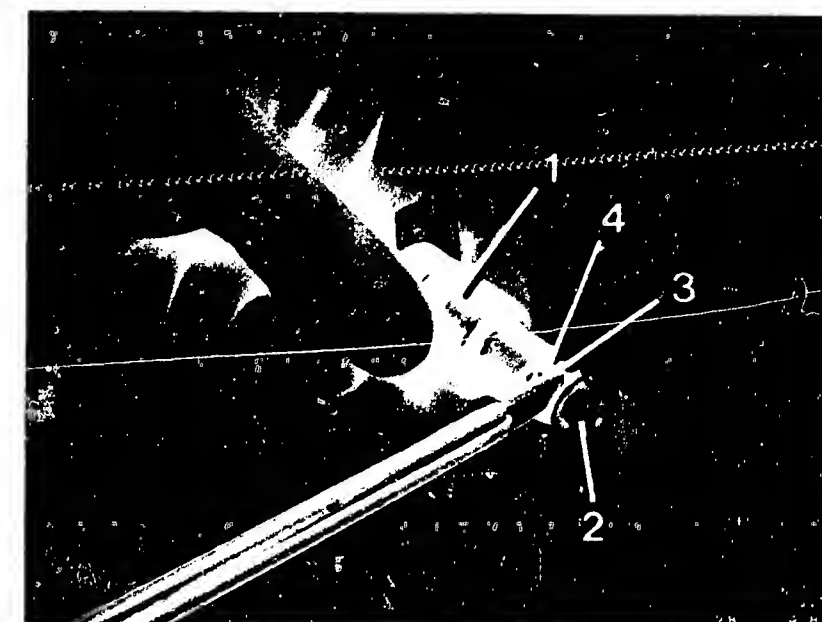
"Engine missing".

Customer complaint remedied?

No

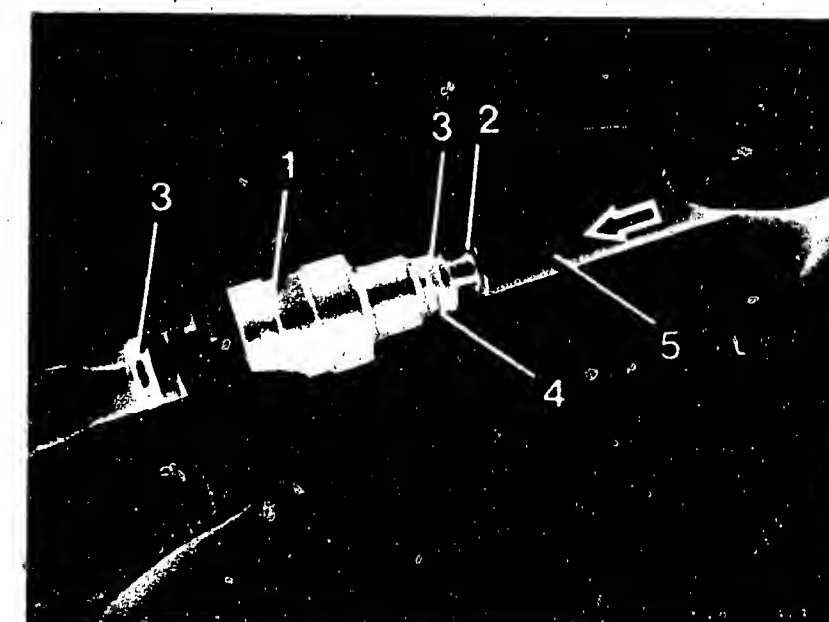
Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



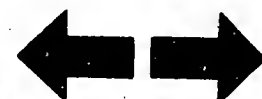
- 1 = Injection valve
- 2 = Protection sleeve
- 3 = Lower O-ring
- 4 = Supporting plate

- 1 = Injection valve
- 2 = New protection sleeve
- 3 = O-ring
- 4 = Supporting plate
- 5 = Pipe-piece



H5

Engine missing
Volvo 360 GLT



H6

Engine missing
Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.

2. The middle row contains descriptions of the testing and adjustment operations on the components.

3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

TROUBLE-SHOOTING START:

Fuel consumption too high

yes

Ignition, engine etc.
O.K.?

no

Remedy fault in ignition and
engine.

yes

Test with universal test
adapter already performed?

no

For testing see Coordinates
B9...C12

yes

Fuel pressure test already
performed?

no

For testing see Coordinates
C13...D5

yes

Continued on H 9/H 10

H7

Fuel consumption too high
Volvo 360 GLT



H8

Fuel consumption too high
Volvo 360 GLT



Fuel consumption too high (continued)

Have all brakes released?

yes

Temperature sensors tested?

no

Testing:

Temperature sensor I measures the intake air temperature and is located in the air duct of the air-flow sensor. Measure the following resistance value between term. 8 and term. 9 of the air-flow sensor: 160...300 Ω . Make direct measurement at temperature sensor II (engine) using ohmmeter. Resistance measurement at term. 10 and term. 38 (ground):

Ambient temperature (+15°...+30°C):
1.30...3.6 k Ω

Engine temperature (approx. +80°C):
250...390 Ω

If incorrect, check for open circuit or short circuit in following leads using ohmmeter:

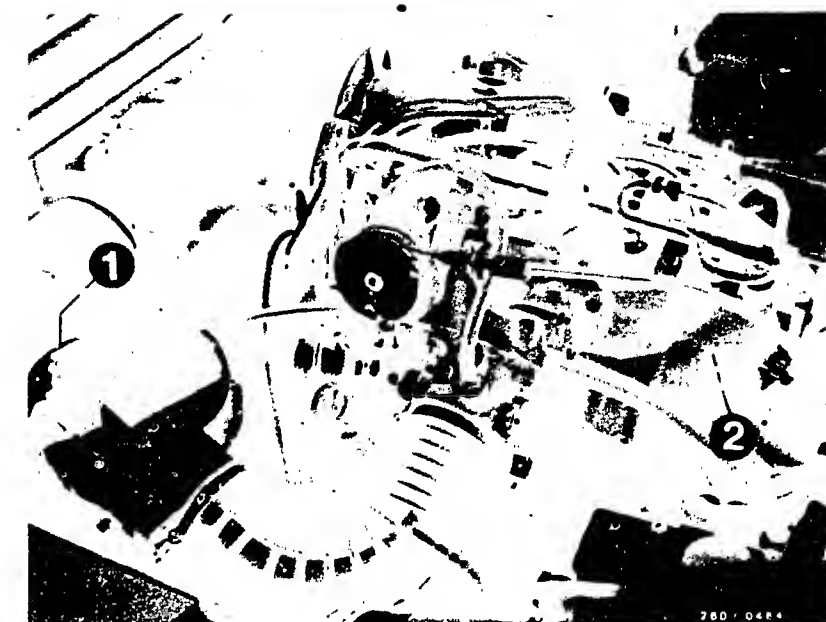
Temperature sensor I:

Multiple plug term. 8 to air-flow sensor term. 8 and air-flow sensor term. 9 to multiple plug term. 9.

Temperature sensor II:

Multiple plug term. 10 to temperature sensor II term. 10 and temperature sensor II term. 38 to central ground (lead 38).

Check all contacts in the plug-in connections.



1 = Temperature sensor I
2 = Temperature sensor II
(white plug)

Continued on H 11/H 12

H9

Fuel consumption too high
Volvo 360 GLT



H10

Fuel consumption too high
Volvo 360 GLT



Fuel consumption too high (continued)

Start valve O.K.?
(leak test)

yes

Solenoid-operated injection
valves mechanically O.K.?

yes

Continued on H 13/H 14

Testing the start valve for leaks:

1. When installed

Pinch off the fuel delivery line at the start valve. If engine then runs smoothly, replace start valve.

2. When removed

Remove the start valve (caution! fire hazard!). Fuel lines and electric leads remain connected (place collector vessel under the start valve). Build up the fuel pressure (remove control relay and fit jumper into connection base between term. 87b and term. 30).

Test specification:

Within one minute max. 1 drop may form at the mouth of the valve.

Caution!

The jumper must be removed again after test is completed and the control relay must be fitted in position.

no

With the engine running, disconnect the injection valve connectors individually, one after the other, from the injection valves and plug on again.

Engine speed must drop if injection valve is O.K.. Using ohmmeter, test for continuity in the connecting leads from control relay term. 87 to the individual injection valves and from the injection valves to the multiple plug term. 12. Set value approx. 0Ω . Resistance of the individual injection valves: 15...20 Ω .

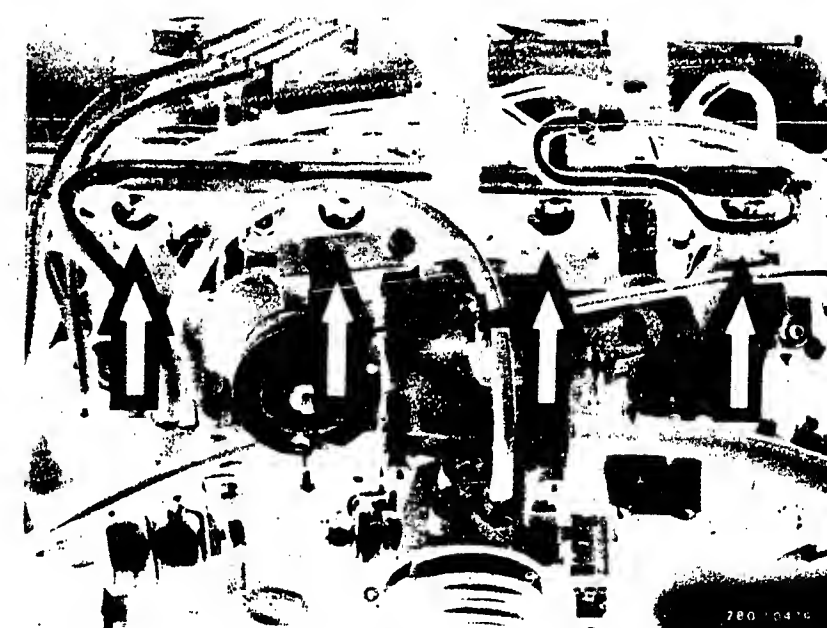
Caution!

When replacing the injection valves, install only solenoid-operated injection valve 0 280 150 209.

Jumper (user-fabricated)

1 = Fuse holder with 10 A fuse
2 = Top view of connection base

Arrows = Solenoid-operated
injection valves



H11

Fuel consumption too high
Volvo 360 GLT



H12

Fuel consumption too high
Volvo 360 GLT



Fuel consumption too high (continued)

Injection valves checked for proper operation?

No

Connect the test lead as follows:
The two-pole plug connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected on the special input of the motortester.

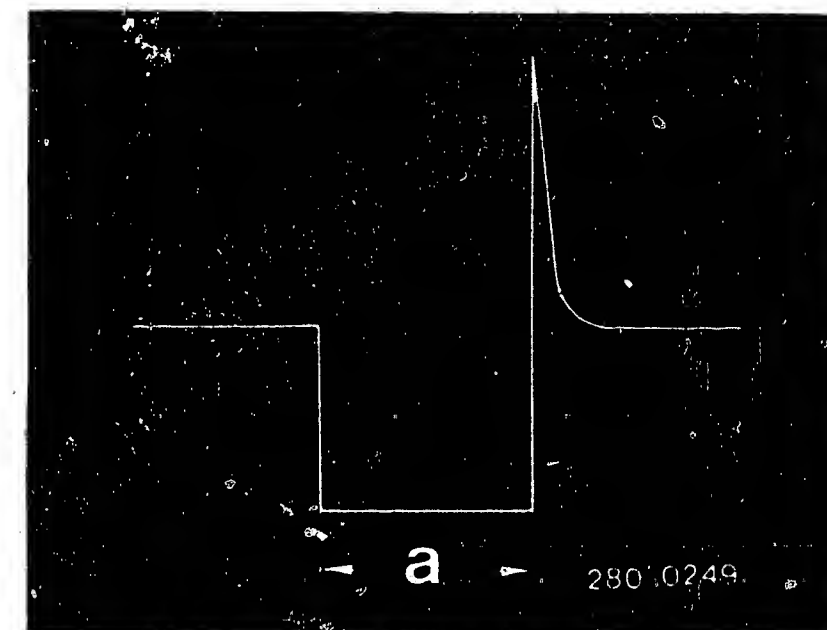
When the correct terminal is connected, the diagram shown opposite is visible on the oscilloscope.

Using the test lead, the injection pulses at the injection valves can be tested with an ignition oscilloscope with the engine running.

If the diagram opposite is not obtained or if there are deviations (interference, missing etc), the other injection valves should also be tested.

In case of interference →
Check routing of leads.

In case of missing →
Eliminate loose contacts in leads or in plug-in connections.



Injection pulse of a switched output stage
(measured at the injection valve)

a = Length of regulation
(Dependent on the engine load)

Continued on H 15/H 16

H13

Fuel consumption too high
Volvo 360 GLT



H14

Fuel consumption too high
Volvo 360 GLT



Fuel consumption too high (continued)

Injection valves electrically and mechanically O.K.?

No

If injection valves are operating correctly, but O-rings are defective, proceed as follows:

1. Repair instructions only for injection valve ..209 as of FD 347 (yellow supporting plate!):
Remove fuel-distribution pipe. Pull off electric terminal. Carefully slide holding clamp out of groove and withdraw injection valve out of fuel-distribution pipe.

Caution!

Catch any escaping fuel. Do not allow to drip onto hot parts of the engine.

Caution!

Protection sleeve must not be levered off.

Cut through the lower O-ring (intake manifold).
Caution! Do not damage protection sleeve. Fit new O-ring over protection sleeve and its bead. Do not damage any parts. Use parts set 1 287 010 704. Do not damage the valve needle when working on the injection valves. If the upper O-ring (fuel-distribution pipe connection) is swollen or damaged, it must also be replaced.

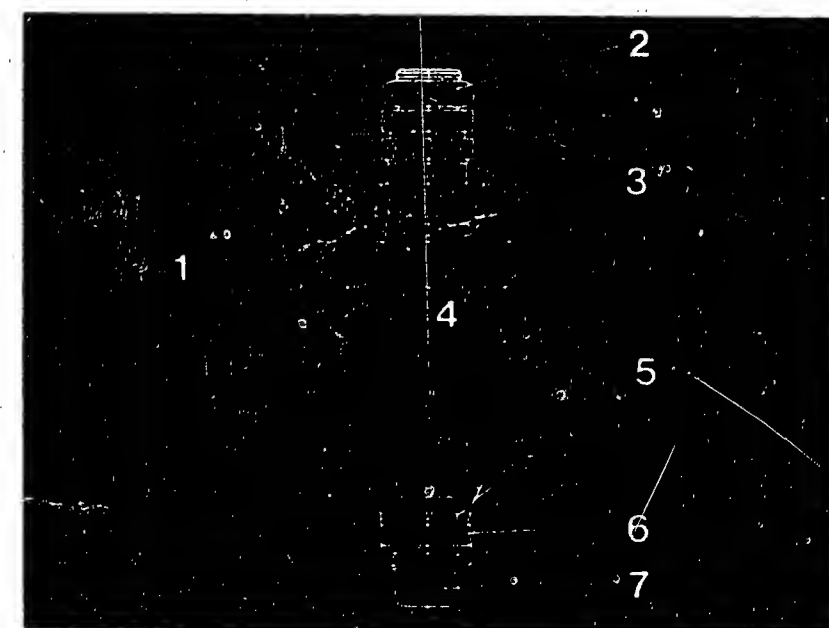
Yes

Continued on H 17/H 18



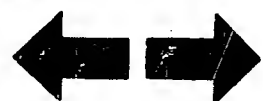
Arrows = Solenoid operated injection valves

- 1 = FD marking
- 2 = Upper O-ring
- 3 = Part number
- 4 = Injection valve
- 5 = Supporting plate
- 6 = Lower O-ring
- 7 = Protection sleeve



H 15

Fuel consumption too high
Volvo 360 GLT



H 16

Fuel consumption too high
Volvo 360 GLT



yes

2. Repair instructions only for solenoid-operated injection valve ..209 up to FD 346:

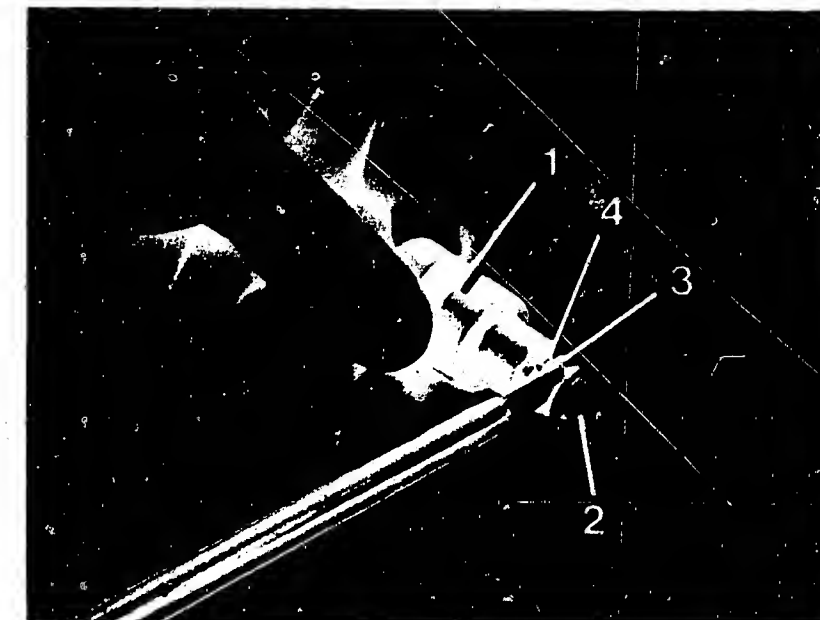
Replace protection sleeve or O-ring.
Remove fuel-distribution pipe.
Remove electrical connection.
Carefully slide holding clamp out of groove and withdraw injection valve out of fuel-distribution pipe

Caution!

Catch any escaping fuel. Do not allow to drip onto hot parts of the engine.
Carefully lever off protection sleeve. (using screwdriver or similar).

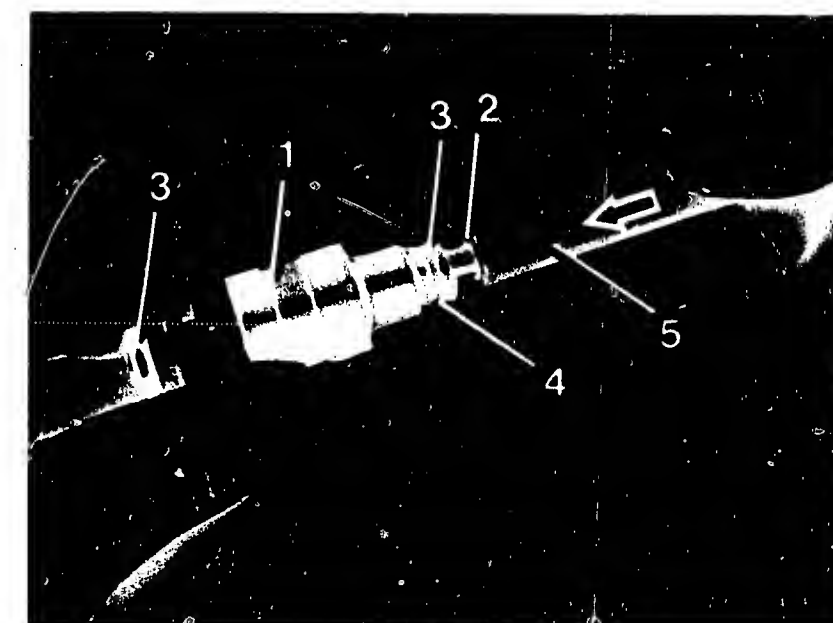
Caution!

Do not damage projecting injection valve needle.
Lift off lower O-ring.
Use parts set 1 287 010 704.
Fit lower O-ring and carefully press on new protection sleeve using user-fabricated pipe-piece (approx. 120 mm long and with inside diameter of 10 mm). Do not damage injection valve needle. If the O-ring (fuel-distribution pipe connection) is swollen, it must also be replaced.



- 1 = Injection valve
- 2 = Protection sleeve
- 3 = Lower O-ring
- 4 = Supporting plate

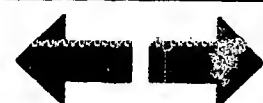
- 1 = Injection valve
- 2 = New protection sleeve
- 3 = Lower O-ring
- 4 = Supporting plate
- 5 = Pipe-piece



Continued on H 19 / H 20

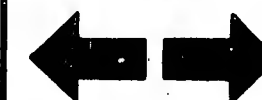
H17

Fuel consumption too high
Volvo 360 GLT



H18

Fuel consumption too high
Volvo 360 GLT



Fuel consumption too high (continued)

Air-flow sensor O.K.?

No

Testing

Remove hose between air filter and air-flow sensor. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.

Test specification: $160...300\ \Omega$

Connect ohmmeter to term. 7 and term. 5 of air-flow sensor. Deflect air-flow sensor flap.

Test specification: $60...1000\ \Omega$

Air-flow sensor flap must return to rest position.

If not, the stopper or the sensor flap is bent.

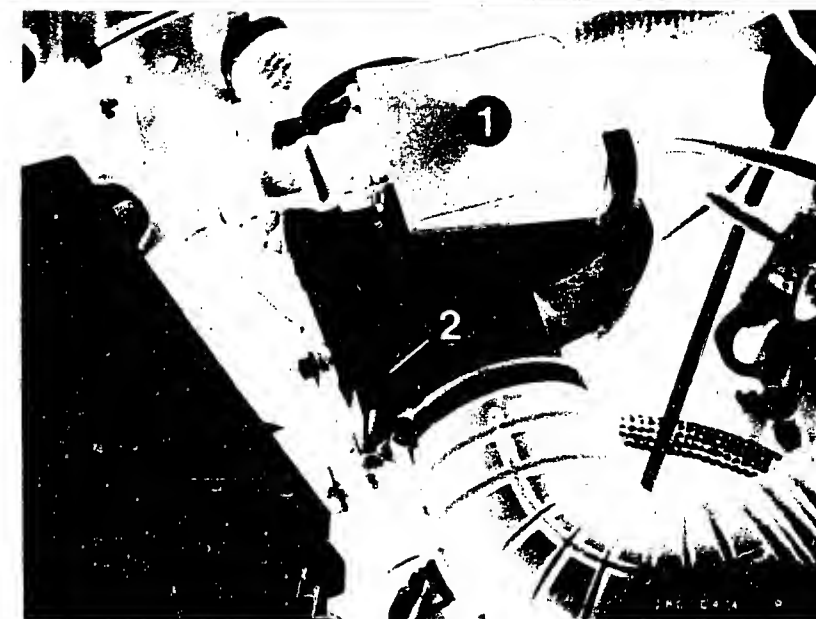
Replace air-flow sensor.

Caution!

When the test is completed, the hose between air filter and air-flow sensor must be fitted again. Make sure the hose clamp is tight.

Yes

Continued on H 21/H 22

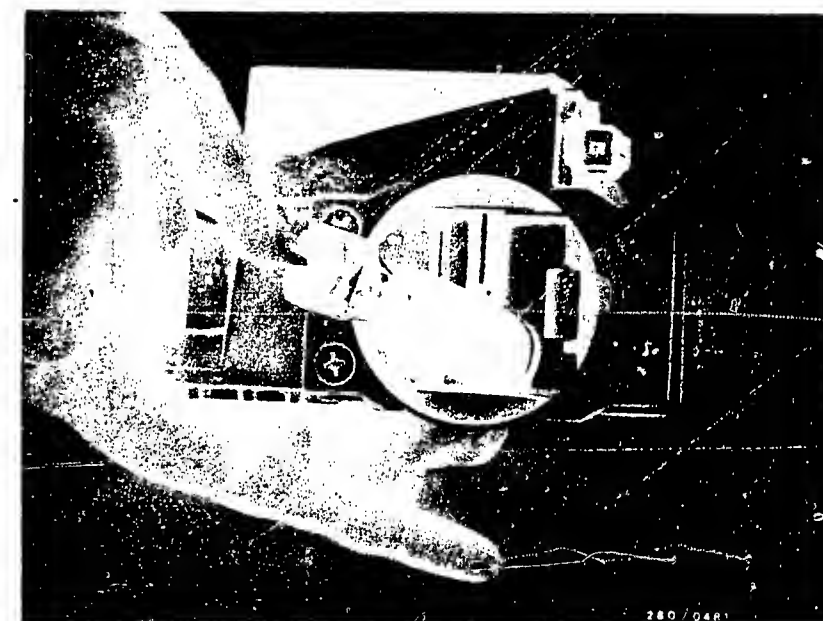


1 = Air-flow sensor

2 = Bypass screw
(CO adjustment)

Turning in clockwise direction =
richer mixture

Opening the air-flow sensor flap.



H19

Fuel consumption too high

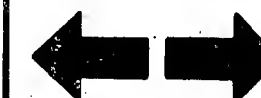
Volvo 360 GLT



H20

Fuel consumption too high

Volvo 360 GLT



Fuel consumption too high (continued)

Potentiometer test (noise test):

Remove air-flow sensor. (Loosen hose clamps on either side of air-flow sensor. Loosen fastening screws of air-flow sensor. Leave plug on). Set motortester to special input and, using special cable, connect to air-flow sensor term. 7 (red clip) and term. 5 (black clip).

Making the adapter lead:

For user-fabrication: Two approx. 1 m long leads of approx. 1.5 m².

2 test prods are fastened to one end. At the other strip off approx. 2 cm of insulation and clamp on the clamps of the special input connecting lead.

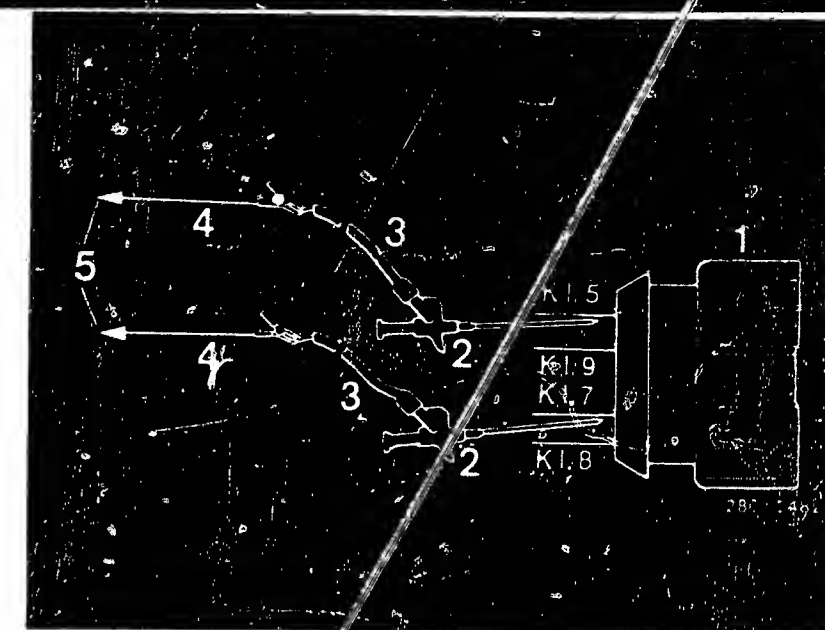
Caution!

Insulate bare joints of adapter lead. (Danger of short circuit). Carefully perform measurements on plug of air-flow sensor. Do not bend any connection springs. Set control lever for image adjustment on motortester as far as it will go to the left (calibrated setting).

Remove control relay. Plug jumper into connection base between term. 87 and term. 30. (Power supply to control unit).

Yes

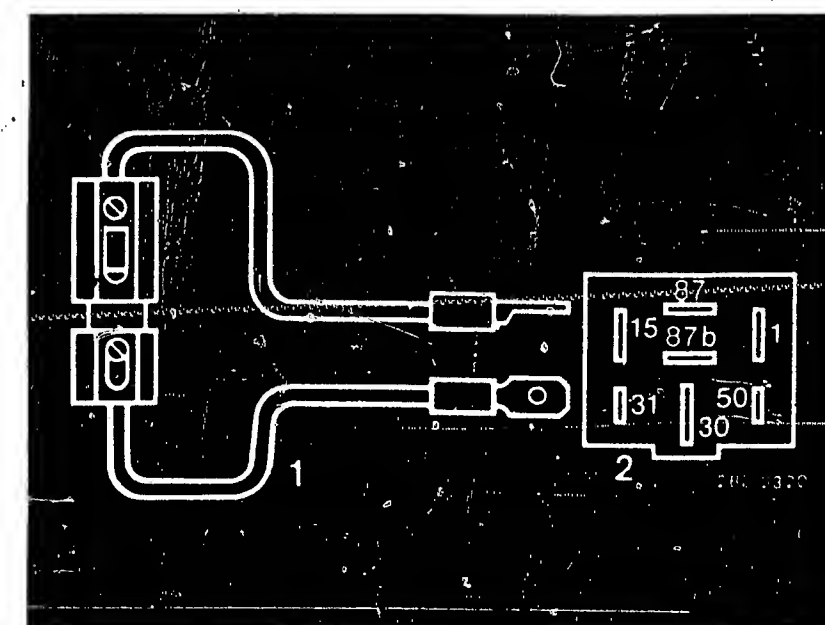
Continued on H 23/H 24



- 1 = Air-flow sensor plug
- 2 = Clamp-type test prod
- 3 = Adapter lead (user-fabricated)
- 4 = Special input connecting lead
- 5 = Motortester special input

Jumper (user-fabricated)

- 1 = Fuse holder with 10 A fuse
- 2 = Top view of connection base



H21

Fuel consumption too high

Volvo 360 GLT



H22

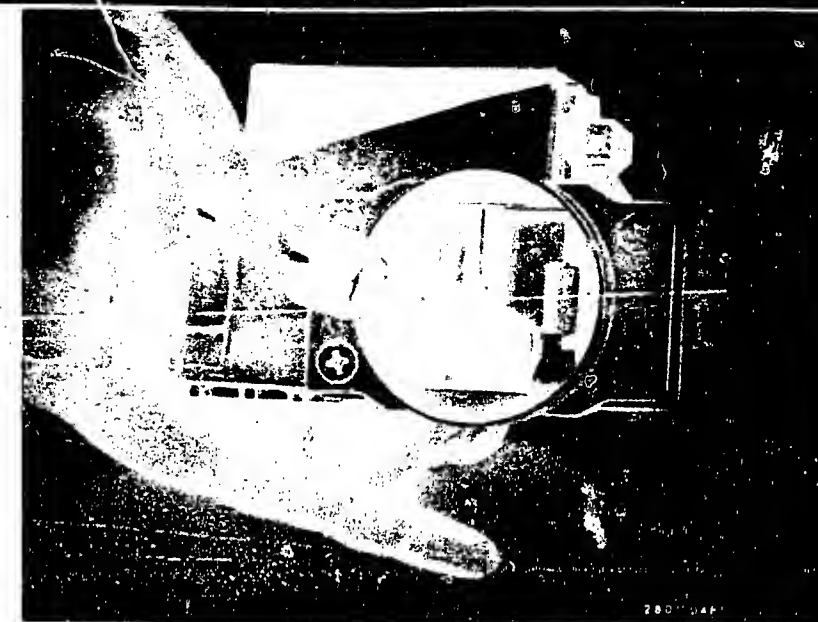
Fuel consumption too high

Volvo 360 GLT



Fuel consumption too high (continued)

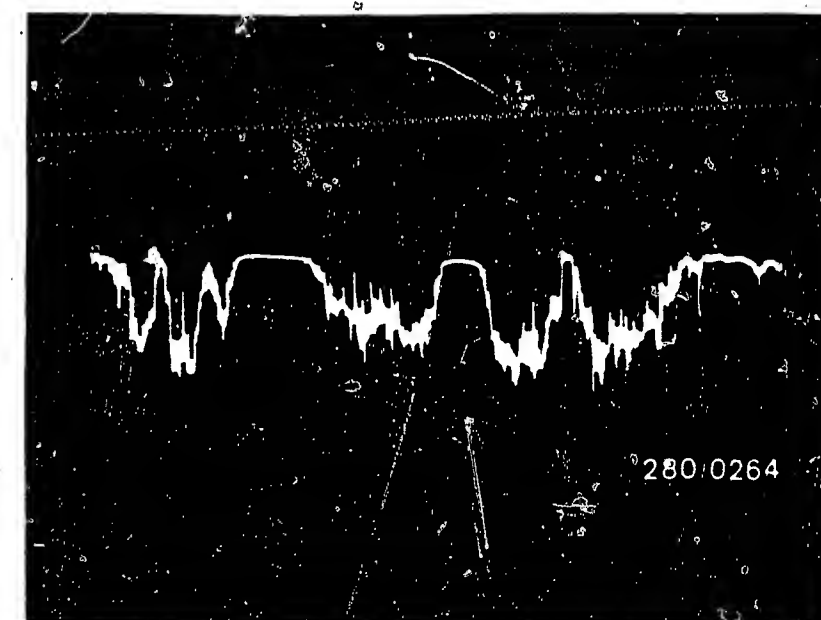
Deflect air-flow sensor flap suddenly several times. A continuous stroke signal must be visible on the oscilloscope. If incorrect (see illustration), replace air-flow sensor. After testing, correctly fit the rubber sleeve on the air-flow sensor plug. Fit all hoses and tighten (leaks).
Caution: After testing is completed, remove the jumper and reconnect the control relay.



Opening the air-flow sensor flap

Yes

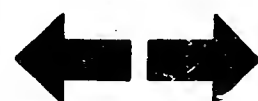
Incorrect noise signal



Continued on J 1/J 2

H23

Fuel consumption too high
Volvo 360 GLT



H24

Fuel consumption too high
Volvo 360 GLT



Fuel consumption too high (continued)

CO and idle speed correctly adjusted?

No

CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed.

Idle speed

Manually-shifted transmission: $850 \dots 950 \text{ min}^{-1}$

Automatic transmission (selector lever in position "P"): $850 \dots 950 \text{ min}^{-1}$

CO setting: $0.5 \dots 2.0\% \text{ vol. CO}$

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction. Check engine speed and CO concentration again. Carry out adjustments in several steps. After adjusting, use new plugs.

Only on Sweden version with Pulsair system (secondary-air induction):

Idle speed: $850 \dots 950 \text{ min}^{-1}$

CO setting (engine at normal op. temp.)

with Pulsair system: $0.3 \dots 0.5\% \text{ by vol. CO}$

Pulsair system inoperative: $0.5 \dots 2.0\% \text{ by vol. CO}$

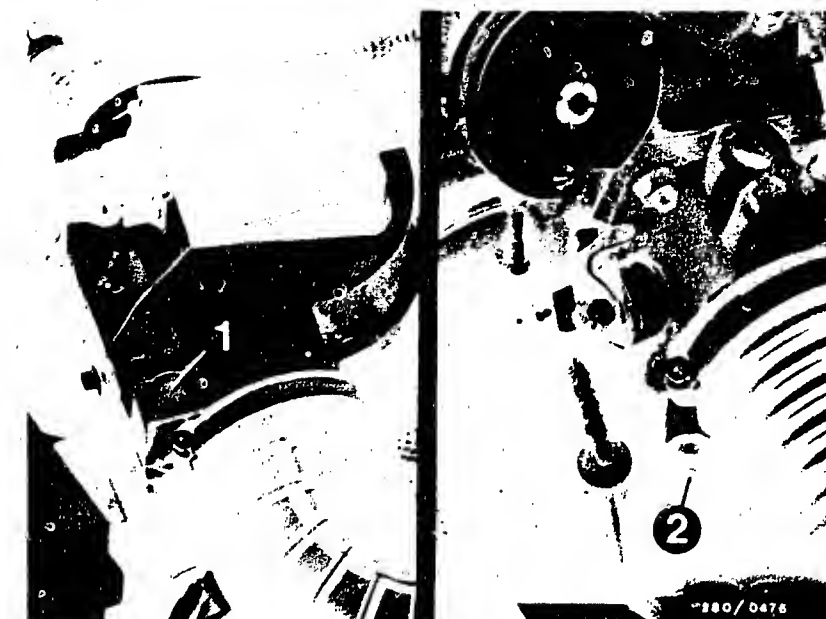
The secondary-air induction system must be rendered inoperative for testing and adjusting the idle and CO settings. To do this, remove hose between non-return valve and air filter on air filter (arrow) and seal off tight with a plug. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the secondary air induction system.

Yes

Can idle speed not be adjusted

Yes

Continued on J 3/J 4

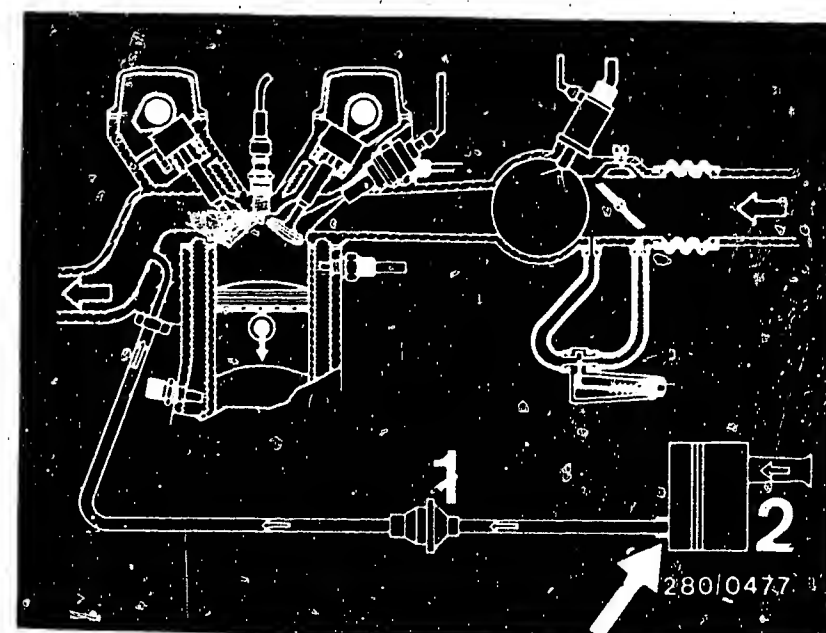


1 = CO adjusting screw

2 = Idle adjusting screw

1 = Non-return valve

2 = Air filter



J1

Fuel consumption too high

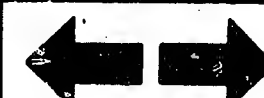
Volvo 360 GLT



J2

Fuel consumption too high

Volvo 360 GLT



Fuel consumption too high (continued)

Yes

Testing completed for
customer complaint

"Fuel consumption too high".

Customer complaint remedied?

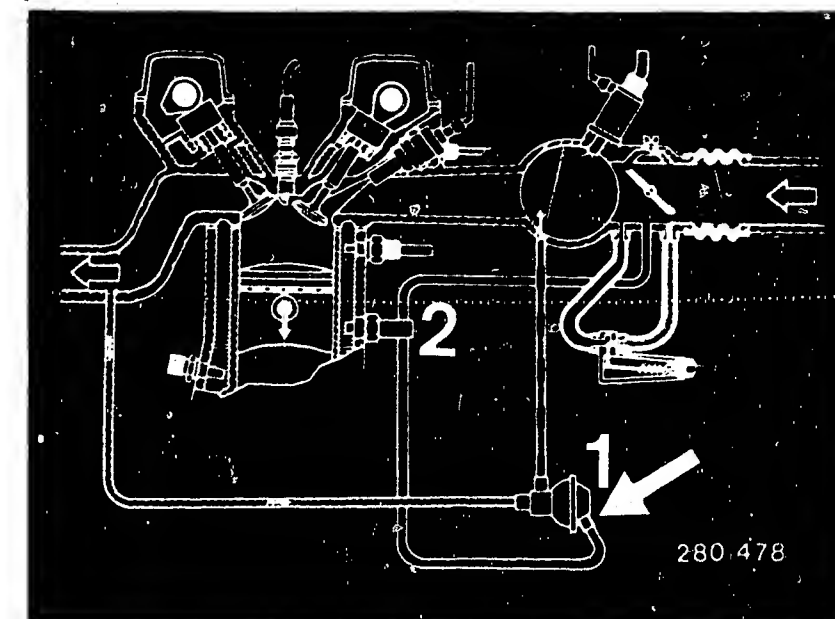
No

Only on Sweden version with exhaust-gas recirculation (EGR):

The exhaust-gas recirculation system must be rendered inoperative when testing/adjusting the idle and CO settings by removing and sealing off the vacuum-control line (arrow) on the EGR valve. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the system.

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1 = EGR valve
2 = Thermo-valve

J3

Fuel consumption too high

Volvo 360 GLT



J4

Fuel consumption too high

Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.

2. The middle row contains descriptions of the testing and adjustment operations on the components.

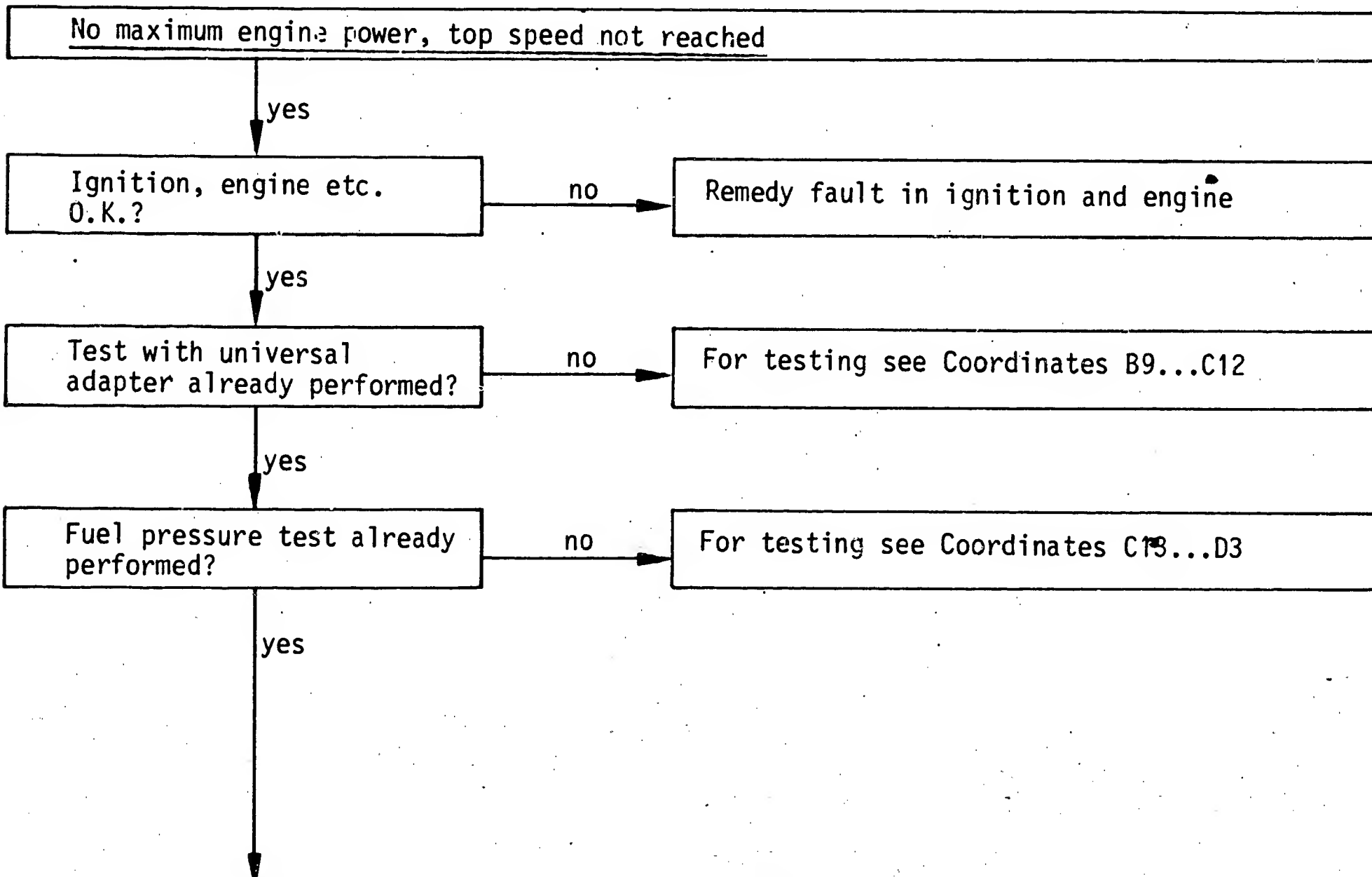
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

TROUBLE-SHOOTING START:



Continued on J 7 / J 8

J5

No maximum engine power

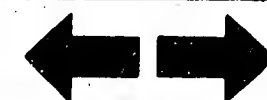
Volvo 360 GLT



J6

No maximum engine power

Volvo 360 GLT



No maximum engine power, top speed not reached (continued)

Does throttle valve open fully?

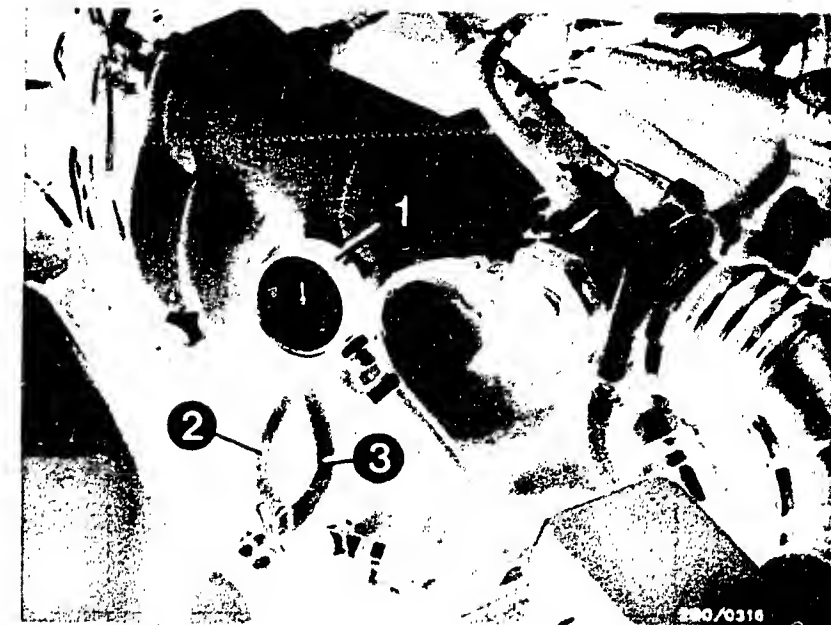
no

Throttle linkage, accelerator pedal O.K.?
Straighten linkage if necessary. Throttle linkage may stick due to floor mat etc..
Using ohmmeter, test for continuity in lead term. 3 from multiple plug to throttle-valve switch term. 3 and from throttle-valve lead 9 (term. 18) to multiple plug term. 9.

Set value approx. 0 Ω
(Deflect throttle valve fully.)
If necessary, replace throttle-valve switch.

yes

Continued on J 9 / J 10



- 1 = Pressure gauge (pressure tester 1 687 231 154)
- 2 = Fuel delivery line
- 3 = Fuel return line

J7

No maximum engine power
Volvo 360 GLT



J8

No maximum engine power
Volvo 360 GLT



No maximum engine power - top speed not reached (continued)

Full-load enrichment O.K.?
(Control unit function)

No

Connect the test lead as follows:
The two-pole plug connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motortester.

When the correct terminal is connected, the diagram shown opposite is visible on the oscilloscope.

Using the test lead, the injection pulses at the injection valves can be tested with an ignition oscilloscope with the engine running.

If the diagram opposite is not obtained or if there are deviations (interference, missing etc), the other injection valves should also be tested.

In case of interference →

Check routing of leads

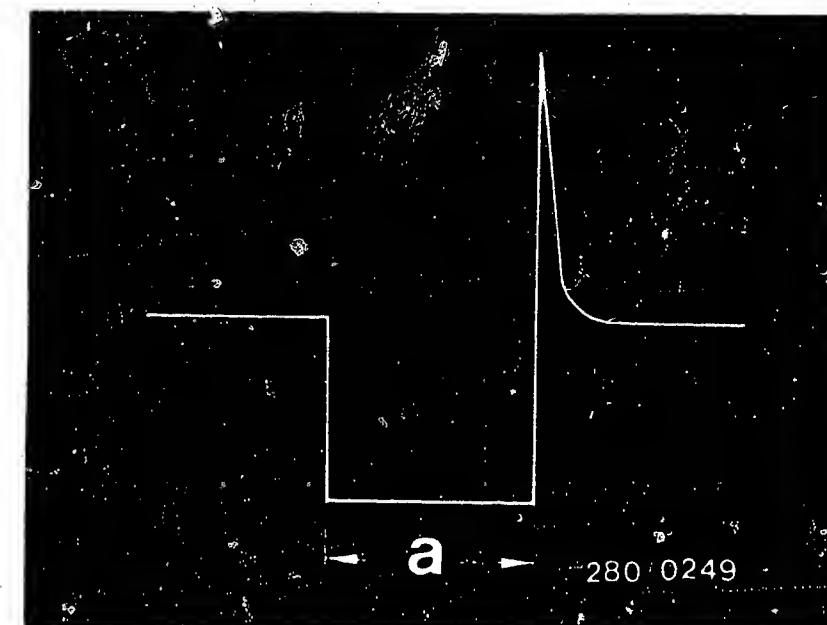
In case of missing →

Eliminate loose contacts in leads or in plug-in connections.

Observe injection pulses at idle. Remove throttle-valve switch plug and bridge term. 3 and lead 9 (term. 18) (insulated jumper). Caution! Do not bend any terminals. Injection pulse must become longer. If incorrect: check for continuity in connecting leads from multiple plug to throttle-valve switch term. 3 and lead 9 (term. 18). If O.K., replace control unit.

Yes

Continued on J 11/J 12

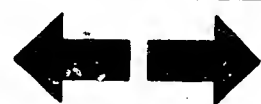


Injection pulses of a switched output stage
(measured at the injection valve)

a = Length of regulation
(Dependent on the engine load).

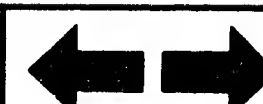
J9

No maximum engine power
Volvo 360 GLT



J10

No maximum engine power
Volvo 360 GLT



No maximum engine power, top speed not reached (continued)

Fuel delivery O.K.?

no

Measuring the fuel delivery:

For testing, undo the junction between the fuel return hose (from pressure regulator) and fuel return line (to fuel tank). If necessary, extend hose and lead into a 5 l vessel with graduated scale.

Remove the control relay and fit a jumper into the connection base between term. 87b and term. 30. Fuel pump must operate.

Test specification: min. 700 cm³/30 s

Caution!

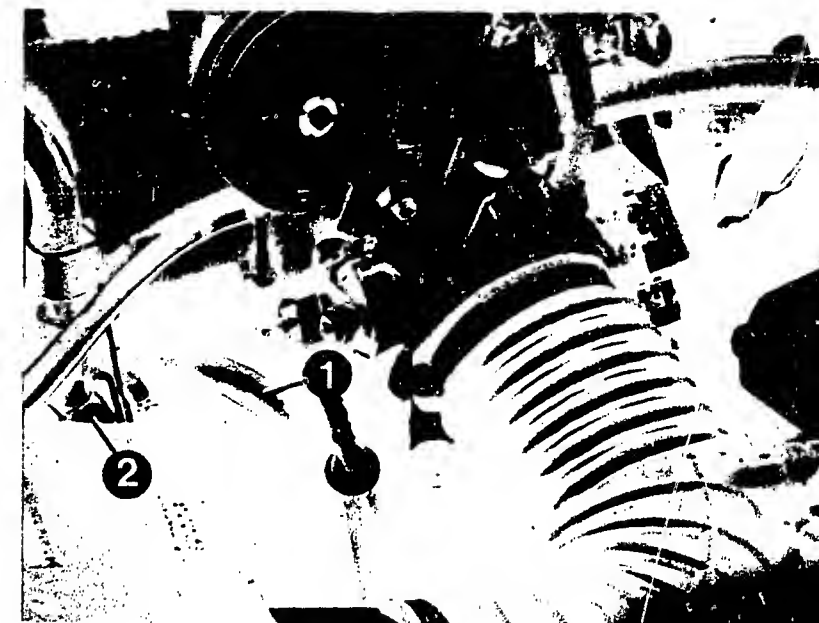
Be sure to remove the jumper after you have finished testing.

Remedy if test specification not reached:

- Fuel filter clogged → replace
- Voltage at fuel pump plugs, with engine running min. 12 V. If not, clean contacts; possibly also eliminate poor ground connection; replace leads.
- Fuel pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump.

yes

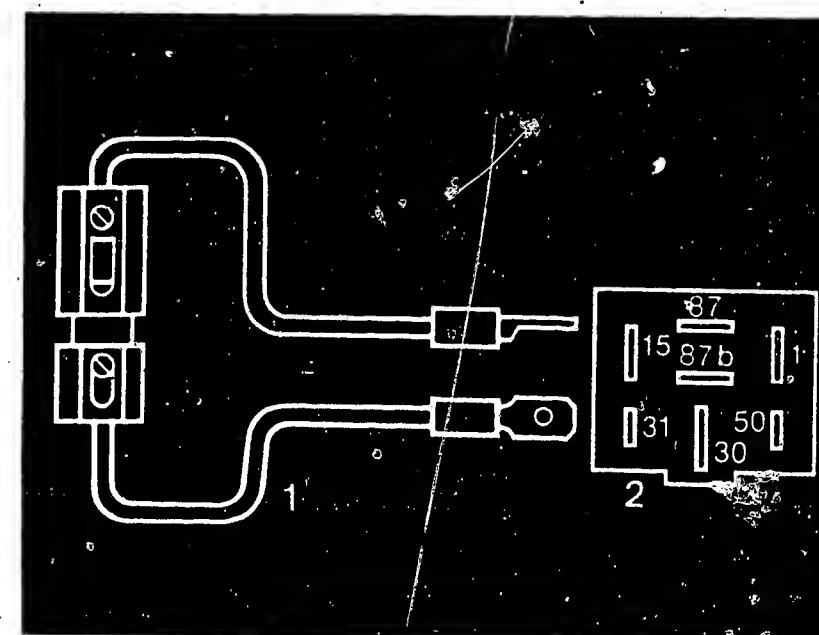
Continued on J 13 / J 14



1 = Fuel return line
2 = Pressure regulator

Jumper (user-fabricated)

1 = Fuse holder with 10A fuse
2 = Top view of connection base



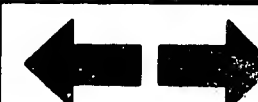
J11

No maximum engine power
Volvo 360 GLT



J12

No maximum engine power
Volvo 360 GLT



No maximum engine power, top speed not reached (continued)

Air-flow sensor O.K.?

no

Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.

Test specification: $160...300\ \Omega$.

Connect ohmmeter to term. 7 and term. 5 of air-flow sensor. Deflect air-flow sensor flap.

Test specification: $60...1000\ \Omega$.

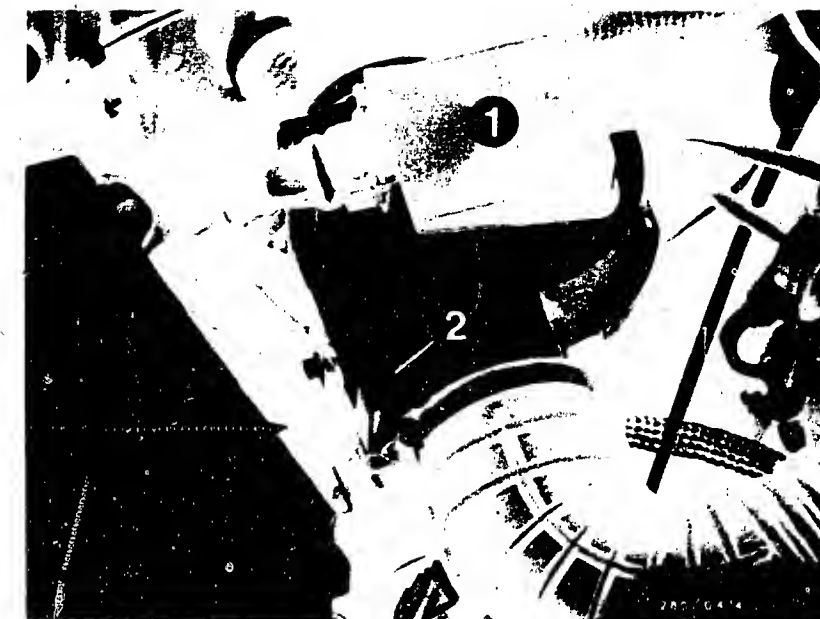
Sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. Replace air-flow sensor.

Caution!

After testing is completed refit the hose between air filter and air-flow sensor. Tighten hose clamp securely.

yes

Continued on J 15 / J 16



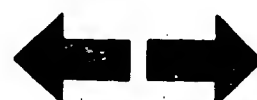
1 = Air-flow sensor

2 = Bypass screw
(CO adjustment).

Turning in clockwise direction
= richer mixture

J13

No maximum engine power
Volvo 360 GLT



J14

No maximum engine power
Volvo 360 GLT



No maximum engine power, top speed not reached (continued)

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electric contacts for loose connection.

yes

Testing completed for customer complaint

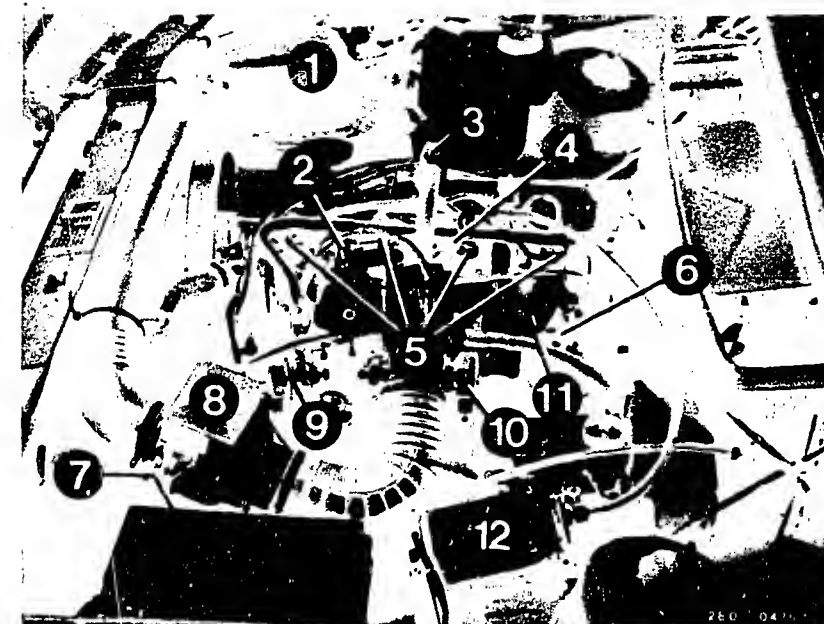
"No maximum engine power".

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



- 1 = Air filter
- 2 = Ground terminal
- 3 = Auxiliary-air device
- 4 = Start valve
- 5 = Injection valves
- 6 = Thermo-time switch
- 7 = Control relay
- 8 = Air-flow sensor
- 9 = Pressure regulator
- 10 = Throttle-valve switch
- 11 = Temperature sensor II (water)
- 12 = Fuel filter

J15

No maximum engine power

Volvo 360 GLT



J16

No maximum engine power

Volvo 360 GLT



Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

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2. The middle row contains descriptions of the testing and adjustment operations on the components.

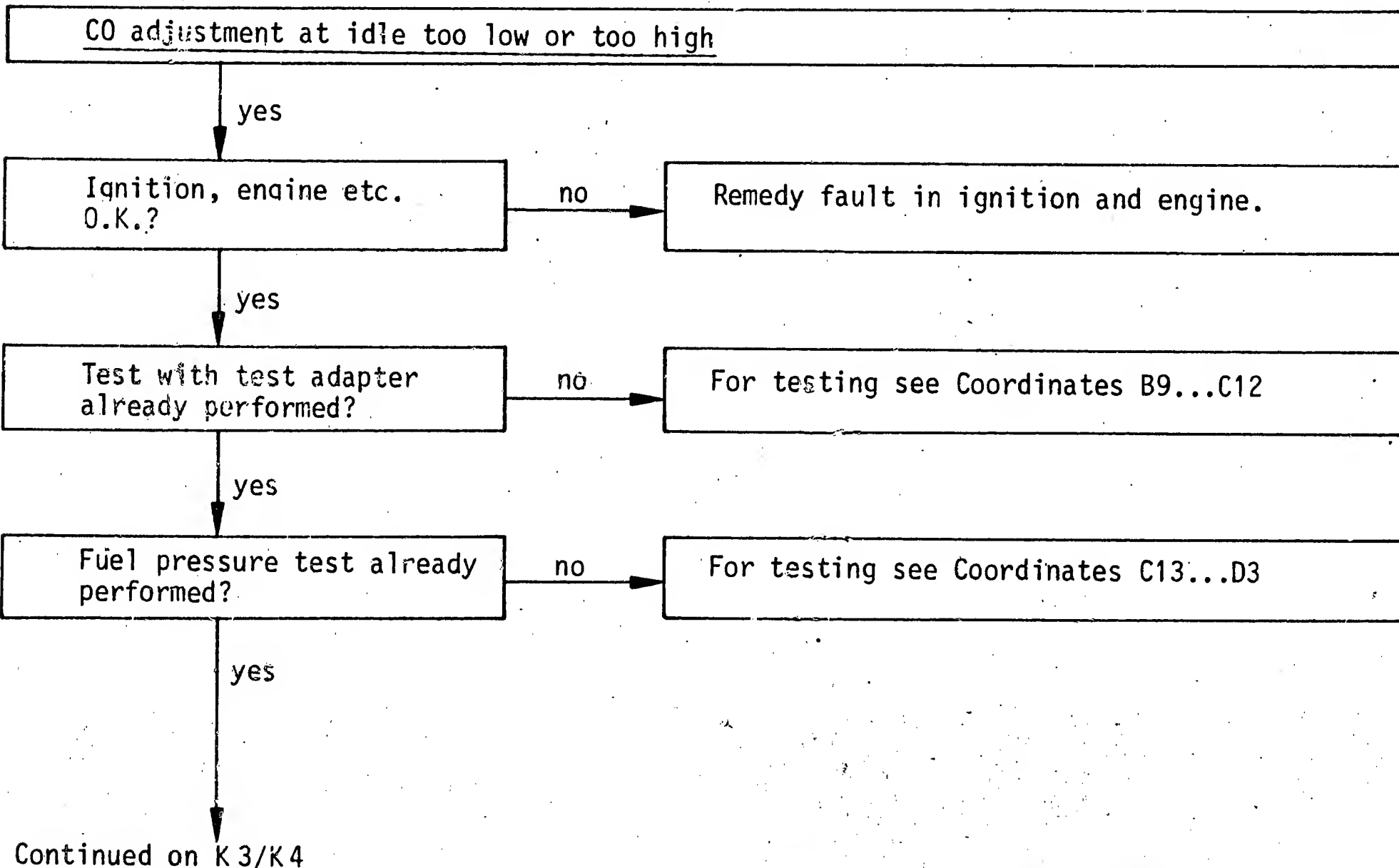
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

TROUBLE-SHOOTING START:



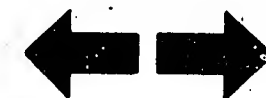
K1

CO adjustment
Volvo 360 GLT



K2

CO adjustment
Volvo 360 GLT



CO adjustment at idle too low or too high (continued)

CO and idle speed correctly adjusted?

No

CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed.

Idle speed

Manually-shifted transmission: 850...950 min⁻¹

Automatic transmission (selector lever in position "P"): 850...950 min⁻¹

CO setting: 0.5...2.0% by vol. CO

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction. Check engine speed and CO concentration again. Carry out adjustments in several steps. After adjusting, use new plugs.

Only on Sweden version with Pulsair system (secondary-air induction):

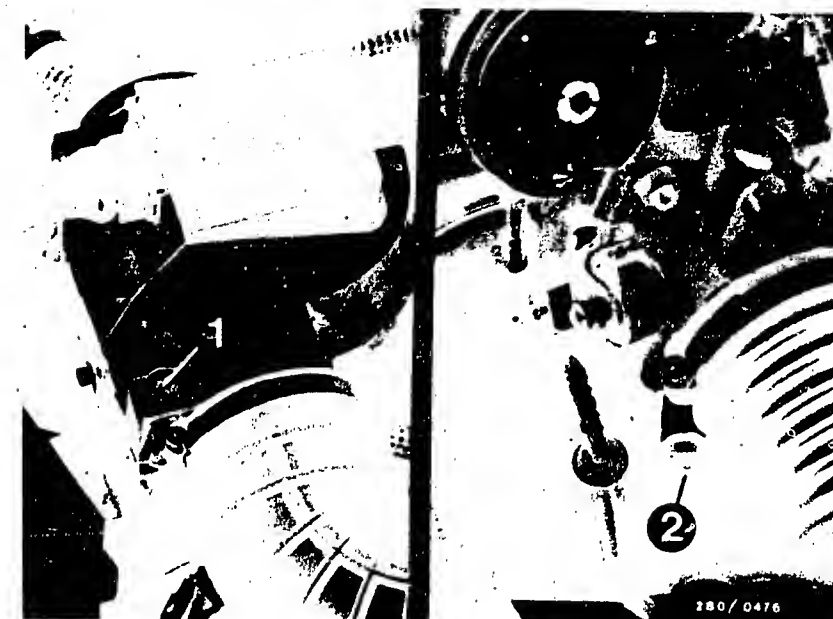
Idle speed: 850...950 min⁻¹

CO setting (engine at normal op. temp.)

with Pulsair system: 0.3...0.5% by vol. CO

Pulsair system inoperative: 0.5...2.0% by vol. CO

The secondary-air induction system must be rendered inoperative for testing and adjusting the idle and CO settings. To do this, remove hose between non-return valve and air filter on air filter (arrow) and seal off tight with a plug. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the secondary-air induction system.



1 = CO adjusting screw
2 = Idle adjusting screw

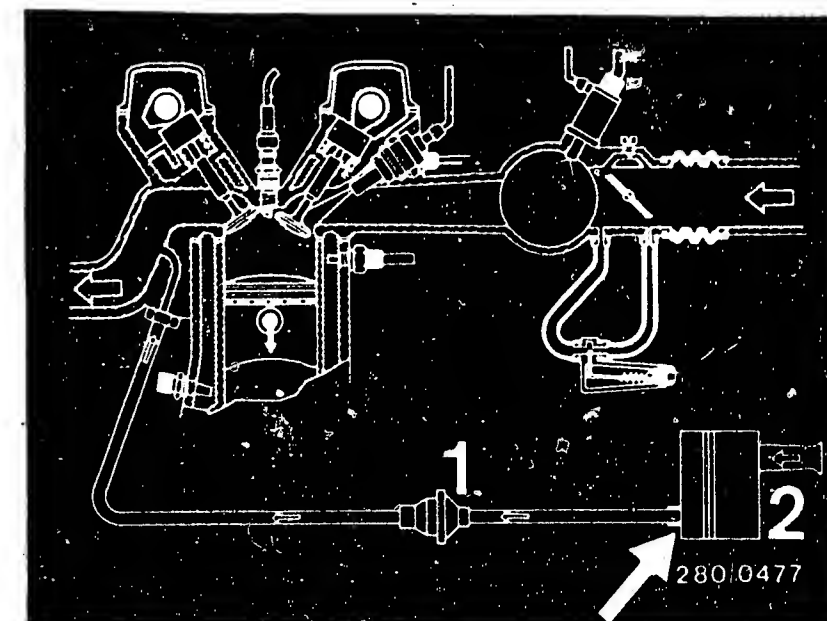
Can idle speed not be adjusted?

Yes

Yes

Continued on K 5/K 6

1 = Non-return valve
2 = Air filter



K3

CO adjustment
Volvo 360 GLT



K4

CO adjustment
Volvo 360 GLT



CO adjustment at idle too low or too high (continued)

Only on Sweden version with exhaust-gas recirculation (EGR):

The exhaust-gas recirculation system must be rendered inoperative when testing/adjusting the idle and CO settings by removing and sealing off the vacuum-control line (arrow) on the EGR valve. If the vehicle is operated in countries with less stringent exhaust-emission legislation it is not necessary to shut down the system.

Yes

Air-flow sensor O.K.?

No

Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Connect ohmmeter to term. 8 and term. 9 of air-flow sensor.

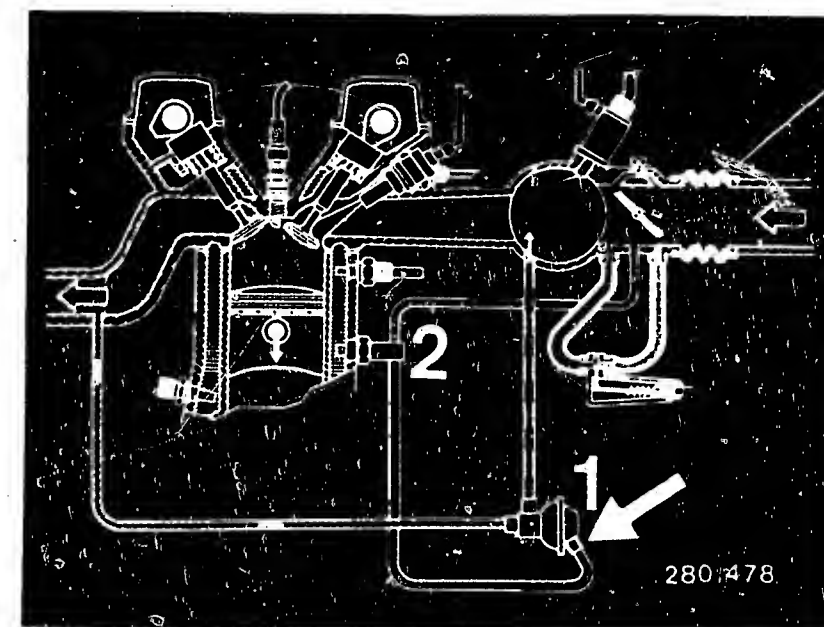
Test specification: $160...300\ \Omega$

Connect ohmmeter to term. 7 and term. 5 of air-flow sensor. Deflect air-flow sensor flap.

Test specification: $60...1000\ \Omega$

Yes

Continued on K 7/K 8



1 = EGR valve
2 = Thermo-valve

1 = Air-flow sensor
2 = Bypass screw (CO adjustment)
Turning in clockwise direction = richer mixture



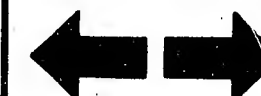
K5

CO adjustment
Volvo 360 GLT



K6

CO adjustment
Volvo 360 GLT



CO adjustment at idle too low or too high (continued)

yes

CO concentration below tolerance?

Without Pulsair:

max. 2.0% by vol. CO

with Pulsair (Sweden):

max. 0.5% by vol. CO

Start valve O.K.?

no

yes

Air-flow sensor flap must return to rest position. If not, the stopper or the sensor flap is bent. The air-flow sensor must be replaced. **Caution!** After testing is completed, refit the hose between air filter and air-flow sensor. Tighten hose clamp securely.

Testing the start valve for leaks:

1. When installed

Pinch off the fuel delivery line at the start valve. If engine then runs smoothly, replace start valve.

2. When removed

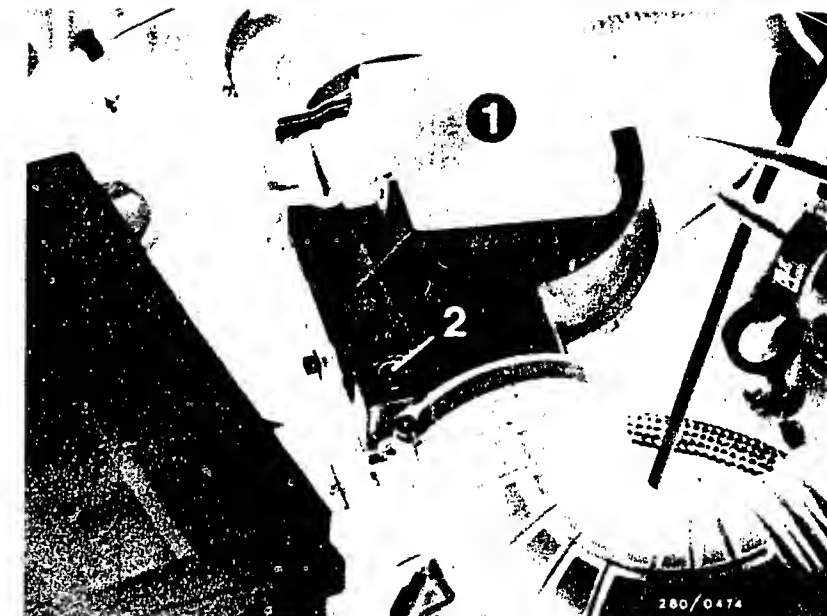
Remove the start valve (**caution fire hazard!**). Fuel lines and electric leads remain connected (place collector vessel under the start valve). Build up the fuel pressure (remove control relay and fit jumper into connection base between term. 87b and term. 30).

Test specification:

Within one minute max. 1 drop may form at the mouth of the valve.

Caution!

The jumper must be removed again after test is completed and the control relay must be fitted in position.



1 = Air-flow sensor

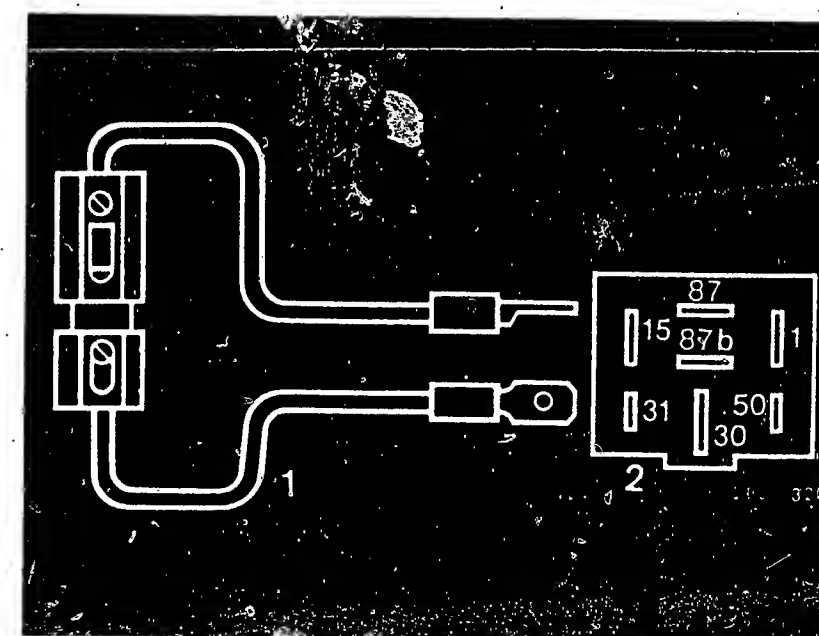
2 = Bypass screw
(CO adjustment)

Turning in clockwise direction
= richer mixture

Jumper (user-fabricated)

1 = Fuse holder with 10A fuse

2 = Top view of connection base



Continued on K9/K10

K7

CO adjustment

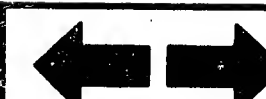
Volvo 360 GLT



K8

CO adjustment

Volvo 360 GLT



CO adjustment at idle too low or too high (continued)

CO concentration below tolerance?
without Pulsair:

max. 2.0% by vol. CO

with Pulsair (Sweden):

max. 0.5% by vol. CO

Temperature sensors O.K.?

no

yes

Testing:

Temperature sensor I measures the intake air temperature and is located in the air duct of the air-flow sensor. Measure the following resistance value between term. 8 and term. 9 of the air-flow sensor:
160...300 Ω .

Using ohmmeter, make direct measurement at temperature sensor II (engine). Resistance measurement at term. 10 and term. 38 (ground):
Ambient temperature (+15°C...+30°C):
1.30...3.6k Ω

Engine temperature (approx. +80°C):
250...390 Ω

If incorrect, check for open circuit or short circuit in following leads using ohmmeter:

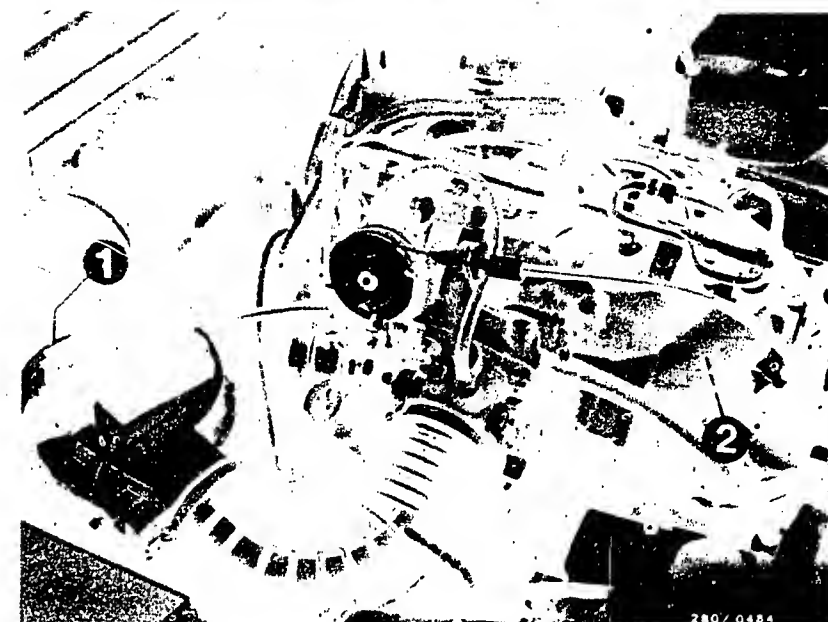
Temperature sensor I:

Multiple plug term. 8 to air-flow sensor term. 8 and air-flow sensor term. 9 to multiple plug term. 9.

Temperature sensor II:

Multiple plug term. 10 to temperature sensor II term. 10 and temperature sensor II term. 38 to central ground (lead 38).

Check all contacts in the plug-in connections.



1 = Temperature sensor I
2 = Temperature sensor II
(white plug)

Continued on K11/K12

K9

CO adjustment
Volvo 360 GLT



K10

CO adjustment
Volvo 360 GLT



CO adjustment at idle too low or too high (continued)

CO concentration above

0.5% by vol. CO (without Pulsair)
or above

0.3% by vol. CO (Sweden version with
Pulsair)?

Air-intake system leak-tight?

no

Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

yes

Testing completed for customer complaint

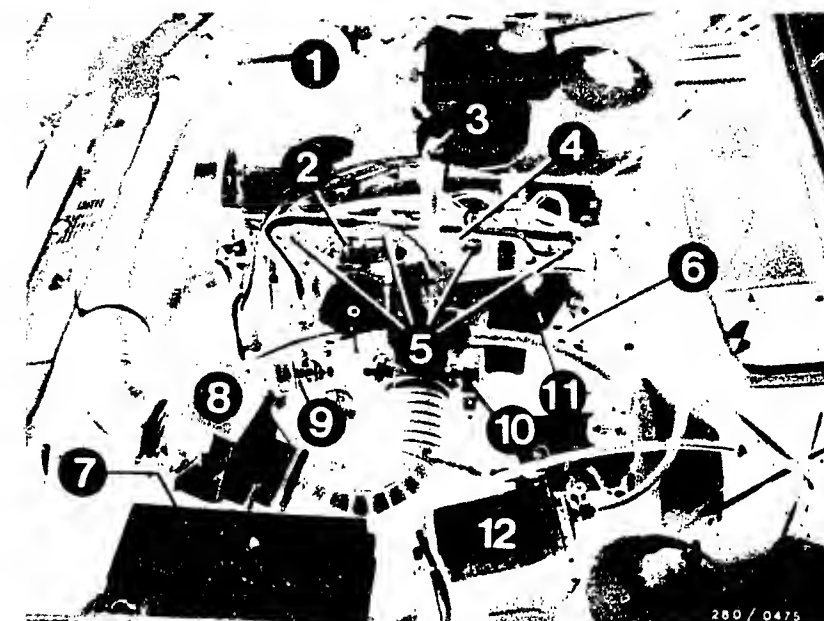
"CO adjustment"

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B8) If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinate B3/B4).
- Engine not mechanically O.K. (compression, valve setting, valve timing, worn camshaft).



- 1 = Air filter
- 2 = Ground terminal
- 3 = Auxiliary-air device
- 4 = Start valve
- 5 = Injection valves
- 6 = Thermo-time switch
- 7 = Control relay
- 8 = Air-flow sensor
- 9 = Pressure regulator
- 10 = Throttle-valve switch
- 11 = Temperature sensor II (water)
- 12 = Fuel filter

K11

CO adjustment
Volvo 360 GLT



K12

CO adjustment
Volvo 360 GLT



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CAR ALARM II - 0 335 411 901

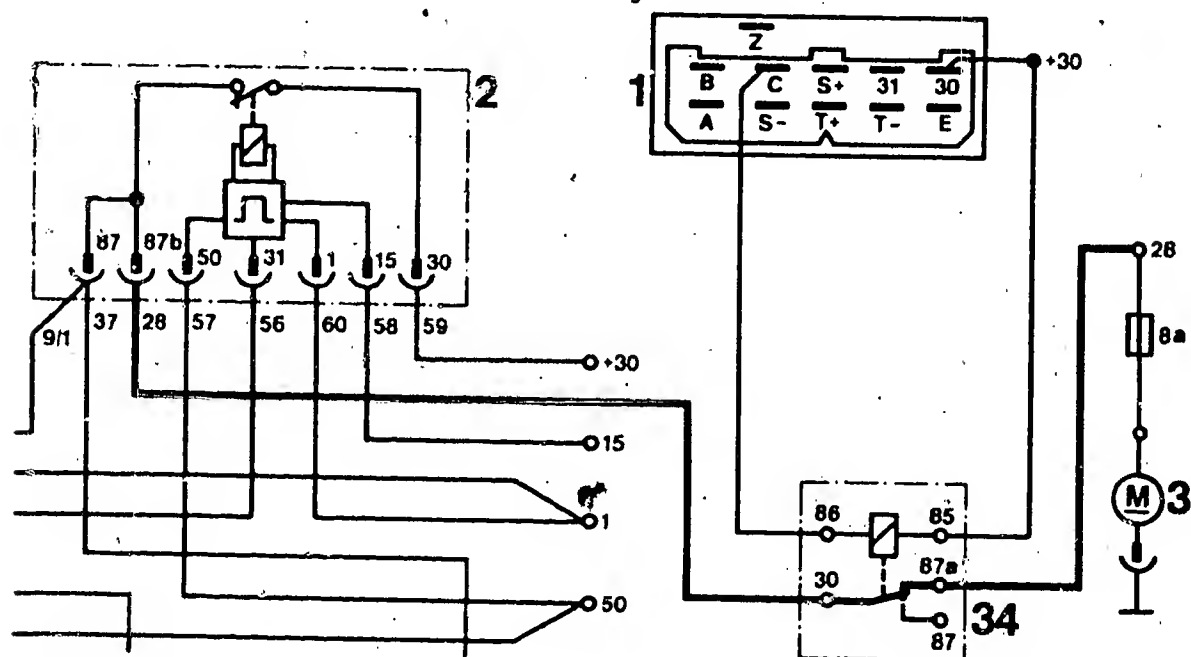
VDT-I-335/111 En

in vehicles with L-Jetronic of the 2nd. generation

11.1981

If Car Alarm II (0 335 411 901) is fitted at a later stage in vehicles in which the engines are equipped with L-Jetronic of the 2nd. generation, then we recommend using the following wiring circuit as protection against theft. In this way the fuel pump is switched off when the alarm system is "primed." No fuel is therefore supplied.

Circuit diagram for L-Jetronic of the 2nd. generation



1 = Alarm relay
2 = Control relay L-Jetronic, 2nd.
generation

3 = Electric fuel pump
34 = Additional relay
0 332 204 150 (formerly
0 332 204 125)

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EXCHANGEABLE NON-RETURN VALVES

in electric fuel pumps 0 580 464 ..

VDT-1-280/107 En

3.1983

(Replaces Ed. 9.1981)

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 364 002	---	1 583 386 011	1 580 203 001
0 580 464 005	---	1 583 386 008	001
006		008	001
007	---	008	001
009	---	008	001
010	---	008	001
017	1 587 010 002		
018	007		
021	006		
022	007		
024	006		
025	007		
027	006		

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DETERMINATION OF THE TEMPERATURE VALUES
GIVEN IN L-JETRONIC MANUALS

VDT-I-280/108 En
5.1982

We have recently been asked with increasing regularity how accurately the engine temperature must be measured when trouble-shooting on the vehicle.

So far in its L-Jetronic manuals KH/VSK has given three or four different temperatures for testing the temperature sensor:

-10 °C, +20 °C, +40 °C and +80 °C,

and two ranges for the thermo-time switch e.g. 35 °C 8 sec.

below +30 °C and above +40 °C.

Since the temperature range need not be subject to such close tolerances, we propose in future the following more appropriate definition:

- Ambient temperature (approx. +15 °C to +30 °C)
- Engine at normal operating temperature (approx. +80 °C).

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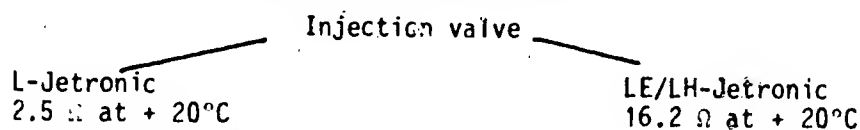
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CODING OF LE/LH-JETRONIC
SOLENOID-OPERATED INJECTION VALVES

VDT-I-280/109 En

5.1982

With the introduction of the LE/LH-Jetronic the internal resistance of the solenoid-operated injection valves has also been changed.



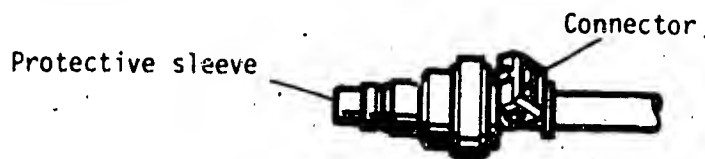
The connector has been left the same for cost reasons and to meet customer wishes.

Caution!

If L-Jetronic injection valves are installed in an LE/LH-Jetronic vehicle, either the control unit or the injection valves will suffer irreparable damage.

Note:

- Install only injection valves with the part number designated for the vehicle.
- As a guide, injection valves with 16.2 Ω internal resistance have a yellow protective sleeve.



- A colour coding (yellow) of the connector (see also VDT-I-280/5) is not generally intended for LE/LH-Jetronic injection valves.

Please direct questions and comments concerning the contents to our authorized representative in your country.

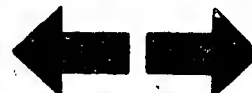
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28

VDT-I-280/110 En

6.1983

PARTS SET FOR INJECTION VALVES

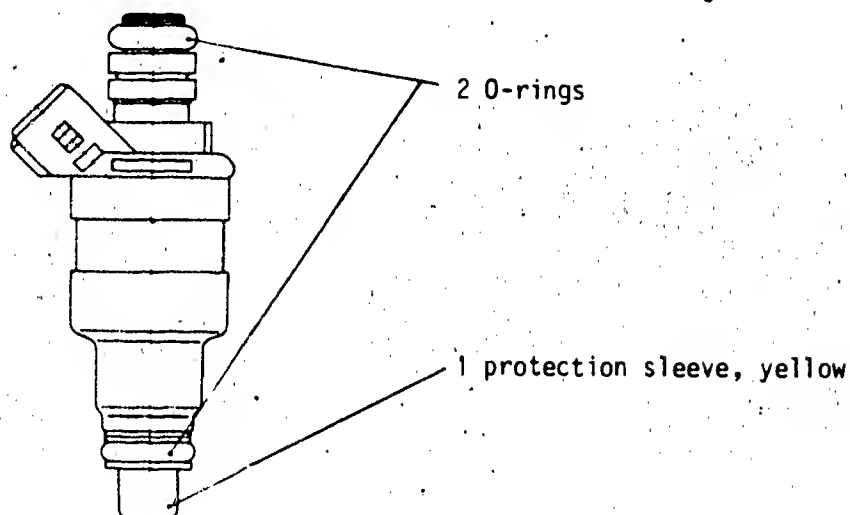
0 280 150 2..

Supersedes 6.1982 edition

AND PRESSURE REGULATORS 0 280 160 2..

A common parts set is available for the L-Jetronic/LE-Jetronic solenoid-operated injection valves and pressure regulators with the new method of connection.

Contents for 1 injection valve:



Contents for 1 pressure regulator:

1 O-ring

1 supporting plate

Since the above-mentioned parts are subjected to extreme temperature stress, they should be exchanged for new parts whenever servicing is carried out.

"Unmetered air" sucked in through injection-valve seals which are not tight, is a frequent case for servicing.

The parts set has the part number 1 287 010 704 and will in future be listed in the service parts microfiche under solenoid-operated injection valves (see EE 00 under 0 280..).

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Technical Bulletin

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PLUG-AND-SOCKET CONNECTORS FOR JETRONIC COMPONENTS

Parts sets

VDT-I-280/111 En

11.1982

(Replaces Ed. 7.82)

Parts sets are available for replacement Jetronic plug-and-socket connectors. The parts sets comprise:

- Connector housing
- Protective cap (rubber sleeve)
- Contact springs

These parts sets are listed on microfiche EE...*.

* See microfiche EE00 under 0 280 ..

- Plug, black, 2-pin, parts set 1 287 013 002 cable connector in conjunction with socket, 2-pin

- Socket, black, 2-pin, parts set 1 287 013 001 for e.g.:

Temperature sensor	0 280 130 0..
Auxiliary-air device	0 280 140 ..
Thermo-time switch	0 280 130 2..
Start valve	0 280 170 ..
Warm-up regulator	0 438 140 ..

- Socket, grey, 2-pin, parts set 1 287 013 003 for:

Solenoid-operated injection valve 0 280 150 ..

- Socket, black, 3-pin, parts set 1 237 000 039 for:

Throttle-valve switch 0 280 120 ..

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After-sales Service

Motor Vehicle Service Information

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HOT-STARTING PROBLEMS

VDT-I-Gen. 050 En

on vehicles fitted with Jetronic

9.1982

Customer complaints

If the vehicle is parked and the engine switched off after having been run at normal operating temperature, it often occurs that the engine proves difficult to start, or won't start at all, and when it does start it runs extremely roughly (only on 2 or 3 cylinders). The engine has to be accelerated a number of times before it runs smoothly.

Causes

For economic reasons ("stretching" of the mineral-oil reserves), it can happen that alcohol in varying quantities has been added to gasoline. Methanol is used for instance.

Such alcohol-added fuels, depending upon the amount of alcohol, adversely affect the hot-starting characteristics of the engine. The addition of alcohol raises the vapor pressure of the fuel and the result is that the boiling point of the alcohol-fuel mixture drops. This in turn leads to the formation of fuel-vapor locks in the fuel system when the engine has been switched off.

This means that when starting, and during the subsequent idle period, the air-fuel mixture is temporarily too lean.

Remedies

- Check the ignition and Jetronic systems, particularly for leaks.
- Changing to another brand of gasoline can sometimes cure the problem immediately.
- In many cases, fully depressing the gas pedal helps during starting, as does slightly depressing the gas pedal during the idle period until the engine runs smoothly.
- Fit the pulse relay 0 340 000 003 (refer also to VDT-I-438/105) in vehicles with K and D-Jetronic.
This step, though, will still not fully alleviate the rough running of the engine during the starting off phase.

Note:

The pulse relay 0 340 000 003 is NOT to be installed in vehicles fitted with L-Jetronic.

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Service Information Sheets

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After-sales Service

Motor Vehicle Service Information

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UNIVERSAL TEST ADAPTER

VDT-I-Gen. 1001 En
1.1982

1. Application

The multiplicity of different fuel-injection and ignition systems at present available on the market, as well as the advances in development which can be expected in the future, demand a new testing concept. In order to maintain the outlay for test equipment, and hence the costs, at a reasonable limit we have developed the universal test adapter.

The following systems can be tested using a test-adapter universal unit together with adapter leads suited to the system in question:

1.1 Systems which are already being fitted as series:

- L-Jetronic (1st generation)
- LE-Jetronic (2nd-generation L-Jetronic)
- Motronic (with the new connector designation, refer to the vehicle-specific instructions!)

1.2 Systems whose introduction is planned:

- Motronic with gearbox control
- KE-Jetronic
- Mono-Jetronic
- Electronic ignition system with ignition map (EZF)

2. Delivery dates and Part Numbers

Available as from 2.1982.

2.1 Universal test adapter (basic unit)

Part Number: 0 684 101 801

Designation: ETT 018.01

2.2 System adapter lead for LE-Jetronic (2nd-generation L-Jetronic)

Part Number 1 684 463 123

First application: For BMW 2.5/2.8 l engines as from 9.1981, and for Opel 2.0 l engines (Manta/Rekord) as from 9.1981.

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2.3 System adapter lead for Motronic with new connector assignment.

(Refer to the vehicle-related instructions!)

Part Number : 1 684 463 124

First application: Porsche 944 as from series production, BMW as from about 3.1982 (Europe)

2.4 System adapter lead for L-Jetronic (in preparation)

Further system adapter leads will be made available along with the introduction of the new systems as mentioned above.

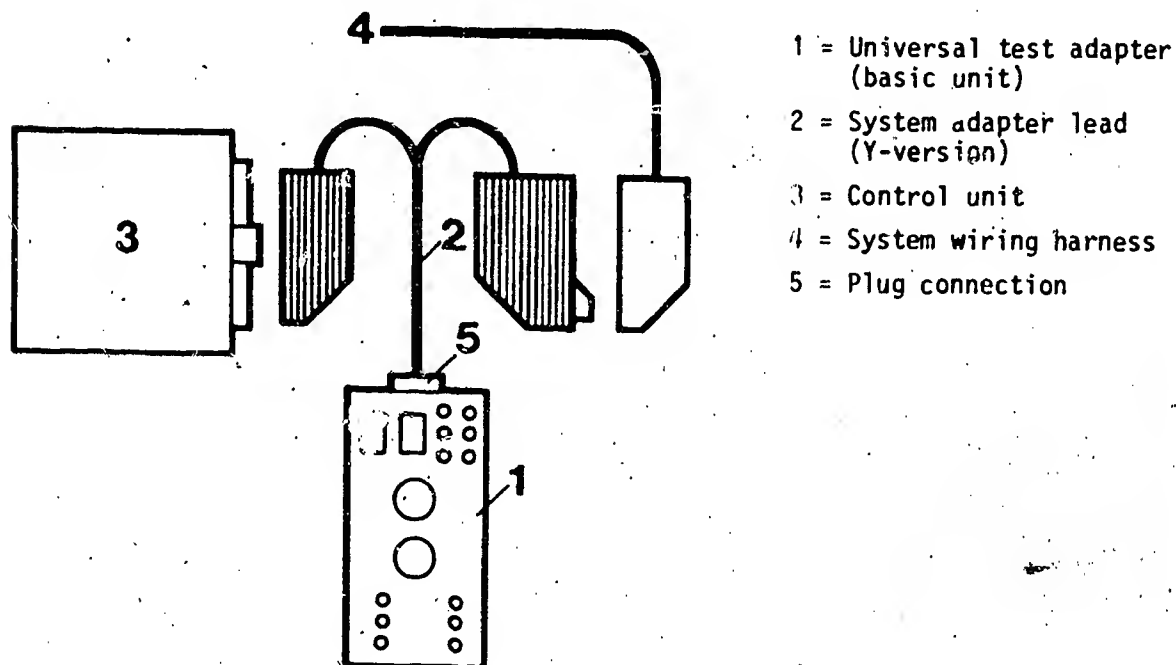
3. Testing procedure

The systems and the components are tested for voltage and resistance values as well as for correct functioning. Evaluation is by means of a multimeter and the Motortester which are connected into the universal test adapter.

Depending upon the complexity of the system, interchangeable adapter lead model 1 or model 2 is provided:

3.1 Adapter lead for peripheral and function testing (Model 1)

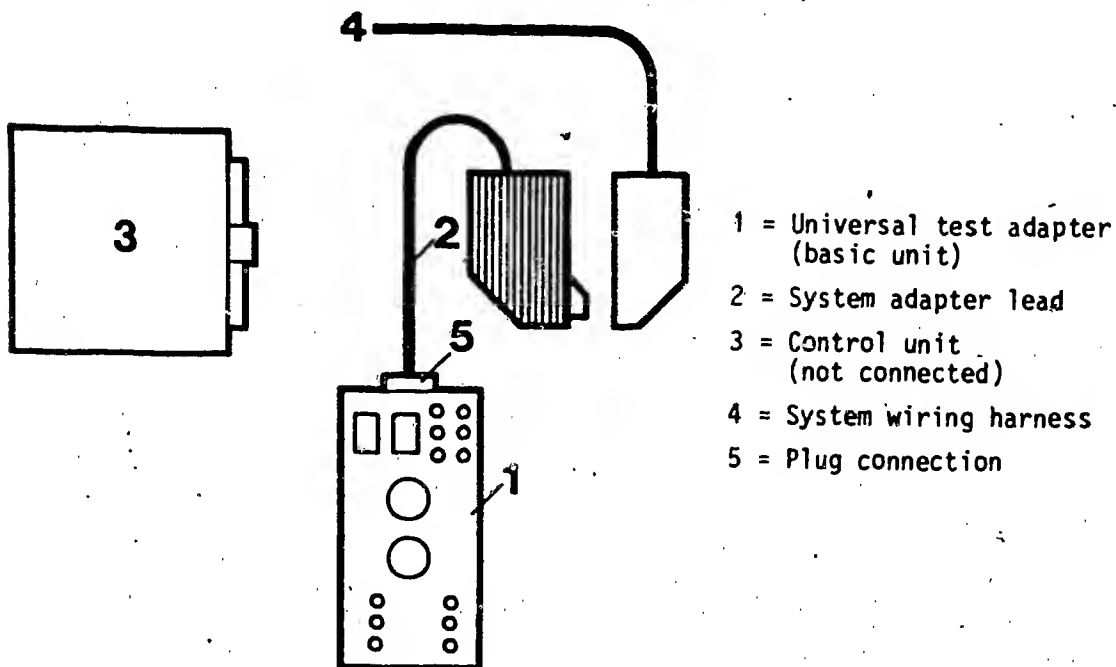
The universal test adapter together with the system adapter lead is to be connected to the system wiring harness and to the control unit (e.g. Motronic).
To be tested: Wiring harness with components and control unit.



3.2 Adapter lead for peripheral testing (Model 2)

The universal test adapter with system adapter lead, is only to be connected to the system wiring harness (e.g. LE-Jetronic (2nd-generation L-Jetronic)).

To be tested: Wiring harness with components (without control unit).

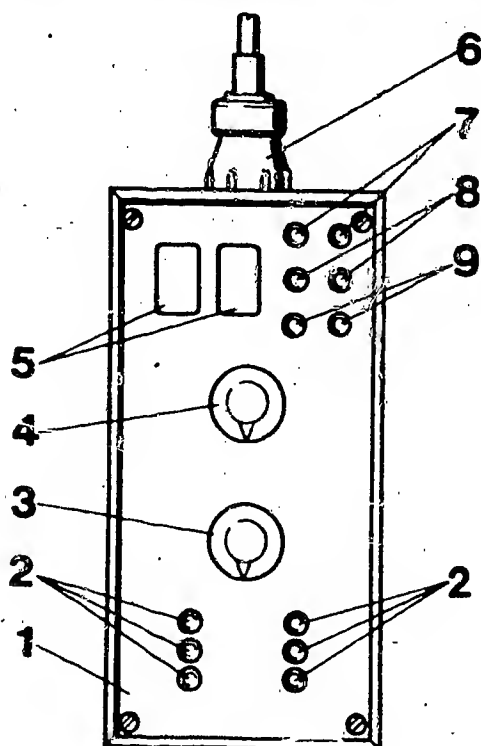


4. Construction of the universal test adapters

The universal test adapter is fitted with 2 program switches for voltage and resistance measurement. The measured values are displayed on the multimeter connected to the universal test adapter. For reasons of safety, the voltage and resistance sockets are separated. In order to measure signals (e.g. injection pulses, ignition pulses), it is necessary to connect a Motortester to the measuring cavities (special input).

When carrying out functional tests with the control unit connected, selected push-buttons are pressed in a number of test-program steps in order to simulate a variety of different engine operating conditions the influence of which is evaluated using the Motortester.





- 1 = Universal test adapter (basic unit)
- 2 = Keyboard for simulation of various conditions e.g. engine temperature, throttle position etc.
- 3 = Program switch "Ohm" for resistance measurement
- 4 = Program switch "Volt" for voltage measurement
- 5 = Measurement "cavities" (for the special input from the Motortester)
- 6 = 63-pole plug-in connection for connecting the system adapter lead
- 7 = Measurement sockets (voltage measurement with a multimeter or with the Motortester)
- 8 = Measurement sockets (resistance measurement with the multimeter)
- 9 = Sockets for special functions (not yet allocated)

Notes:

1. The Motronic test adapter (0 684 101 800, ETT 018.00) will continue to be used for Motronic-equipped BMW vehicles (with old connector assignment) up to about year of manufacture 3.1982 (refer to vehicle-specific instructions).
2. Details on the operation of the universal test adapter, and the test specs, are to be found in the vehicle-specific after-sales service instructions.

3. Caution! Change of Part Number:

On the SIS-microfiches OPE-00/J22 (Coordinates A14 and A17) the new Part Numbers are as follows:

Universal test adapter: 0 684 101 801

Adapter lead : 1 684 463 123



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When direct trouble-shooting a specific L-Jetronic component it is absolutely essential to look up the respective test step according to the customer complaint.

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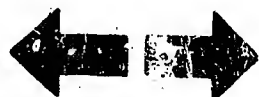
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Department for Technical Publications KH/VDT,
Postfach 50, D-7000 Stuttgart 1

Published by: After-sales Service Department for
Training and Technology (KH/VSK). Press date: 3.1983

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Published by: After-Sales Service, Department for
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